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ABSTRACT

The Technology for Literacy Center (TLC) was designed to find a new and better way to teach literacy skills to adults by using computers and other forms of technology. It served 1,300 illiterate adults in the St. Paul, Minnesota, area of Ramsey, Washington, and Dakota counties. The project had four major components: direct services, training, research, and incentive grants. A formative evaluation of the plan was conducted to identify strengths and weaknesses of the project and to correct them. A summative evaluation (detailed in this report) was conducted to assess the overall merit of the project. Data were collected through standardized achievement tests, group interviews, exit interviews, student questionnaires, learner activity logs, and case studies. The evaluation showed that the TLC has been successful and effective in meeting its mission. Some of the factors accounting for this success include the technology, leadership, a dedicated and skilled staff, evaluation, the Donor Review Board, performance orientation, attachment to the St. Paul Public Schools, a multidimensional project conceptualization, special attributes of the Technology for Literacy Center, careful planning, and a culture of learning. Issues identified for ongoing discussion included effective use of volunteers, outcome measures, staff development and stress, and funding. (KC)

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ED295023

A Special Report from the
Donor Review Board
Technology for Literacy Project

# *The Technology for Literacy Project Evaluation*

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Stacey Hueftle Stockdill,
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To this list we must add Jean Hart, Vice President of the Saint Paul Foundation, who skillfully assembled and coordinated the elements so necessary for the success of this project.

Ronald M. Hubbs
for the Donor Review Board



Donor Review Board:

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## TABLE OF CONTENTS


Introduction vi
*by Ronald M. Hubbs*

The Technology for Literacy Project Description 1
*by Terilyn C. Turner*

The Technology for Literacy Project Evaluation Plan 13
*by Stacey Hueftle Stockdill*

Summative External Evaluation:
Technology for Literacy Project 18
*by Michael Quinn Patton with*
*Stacey Hueftle Stockdill*

Benchmark Cost Descriptons of
The Technology for Literacy Project 104
*by Darrell R. Lewis*

Case Studies:

Methodology 158
Case Study 1: Barbara Jenkins 159
*by Katherine R. Wellington*
Case Study 2: Sarah Jacobson 168
*by Stacey Hueftle Stockdill*

List of Contributors 177

## LIST OF TABLES


| Tables from the Summative Evaluation | | Page |
|---|---|---|
| I. | Comparisons of learner characteristics for different time periods | 29 |
| II. | Grade level changes by hours of instruction | 32 |
| III. | Variations in achievement and instructional hours | 34 |
| IV. | Pretest equivalency comparisons between the summative group and control groups in reading and math | 44 |
| V. | Pretest to posttest gain score comparisons between the summative and control groups | 45 |
| VI. | Comparisons of TLC with other literacy programs | 48 |
| VII. | Participation and attrition data | 51 |
| VIII. | Reasons for non-participation and dropping out | 54 |
| IX. | Completion data | 57 |
| X. | Retention and attrition comparisons | 59 |

| Tables from the Cost Effectiveness Evaluation | | Page |
|---|---|---|
| 1. | Annual totals for all resource components in TLC | 137 |
| 2. | Average unit costs of resources in TLC | 139 |
| 3. | Percentage allocation of costs to TLC functions | 143 |
| 4. | Dollar allocation of costs to TLC functions | 145 |
| 5. | Allocations of direct service costs to educational service programs | 147 |
| 6. | Total instructional resource costs and activities for all educational programs | 149 |
| 7. | Summary of inputs, outputs and benchmark ratios | 150 |
| 8. | Reconciliation of cash budget with costs of resource components | 152 |
| 9. | Allocations of costs to TLC constituencies (distributions of cost burden) | 154 |
| 10. | Estimated start-up and recurring costs for alternative instructional settings | 155 |
| 11. | Benchmark cost ratios for adult basic reading program | 157 |

## INTRODUCTION

It was decided early in the planning of the Technology for Literacy Center (TLC) that there would be professional evaluations of the educational and economic outcomes. That is what you will find in this monograph.

The F.R. Bigelow Foundation has a longstanding commitment to education and lifelong learning. The history of this specific project reaches back nine years to when the trustees initiated a plan to coordinate adult literacy services in Ramsey, Dakota and Washington Counties, and to increase public awareness of the literacy problem, which is correctly labeled a national scandal.

In searching for additional means to provide learning opportunities for adult illiterates, it was decided to place special emphasis on technology. Good fortune brought strong financial support from foundations, corporations, a public school system, and individuals (please see acknowledgements) for three years, ending in 1988. Also, the project has been favored with exemplary management and dedication from those involved.

TLC is structured to provide four components: direct service, training, research, and incentive grants to encourage the use of technology and adoption of the TLC curriculum by other literacy programs.

Above all, the value of this project is found in its impact on the lives of the learners--helping them to do better in the work place; overcome many everyday, but often devastating social and economic barriers; and enjoy a vast enrichment in their personal lives because they can read.

Ronald M. Hubbs
Past Chairman, Donor Review Board, TLC
Chairman, F.R. Bigelow Foundation (retired)

# The Technology for Literacy Project Description

*Terilyn C. Turner, Project Director*

The summative evaluation of the Technology for Literacy Project was completed in June of 1987, after the first two years of program operation. By that time, numerous agencies and individuals had requested access to the findings. It was felt that release of this information could best be accomplished through publication of a monograph, to include the complete summative evaluation, cost effectiveness evaluation, formative evaluation description, case studies, and project description.

These findings raise as many questions concerning literacy instruction and literacy evaluation, as they provide definitive answers. This document is published and distributed with the hope that the findings will be interpreted in the larger context of literacy issues nationally, and that other literacy projects will adopt evaluation and public accountability as part of their literacy instruction.

## BACKGROUND

The Technology for Literacy Project began the way most important projects do--as one person's dream. In this case, the dream was that of Ronald M. Hubbs, known nationally for his vision in business, and locally as a concerned humanitarian and community leader. Mr. Hubbs, chairman of the F.R. Bigelow Foundation, had provided philanthropic and leadership

support to a wide variety of literacy projects prior to asking the question, "What is the role of computers in this fight against functional illiteracy?"

The answer to this question was researched in 1983 by Jean E. Hart, then educational program officer for the Saint Paul Foundation. The purpose of her inquiry was to assess the potential of the computer for literacy instruction. A survey of numerous literacy projects throughout the country showed that few were using computers. One such project that had just begun was the ABLE Center in Charlotte, North Carolina.

The director of the ABLE center, Terilyn C. Turner, was contracted to assess the feasibility of designing an adult literacy center in St. Paul, using computers as the principal means of instruction. An advisory committee composed of educational and community leaders in the Twin Cities was formed to assist in the planning of the project. One year was spent researching the use of computers in literacy projects nationally, and conducting an assessment of the literacy needs in the St. Paul community. The project proposal developed through a careful planning process; an evaluation design was included as a component of the project from the outset.

**The concept**

The Technology for Literacy Project is designed to find a new and better way to teach literacy skills to adults by using computers and other forms of technology. The mission of the Project is to improve the literacy level of adults residing or working in the greater St. Paul area of Ramsey, Washington and Dakota counties. The project has four major components:

**Direct service**

The Technology for Literacy Project provides direct service to adults in need of basic skills instruction by establishing a demonstration model that incorporates an educational system using technology.

**Training**

The Project trains teachers, administrators, graduate students, and volunteers to incorporate technology in their programs.

**Research**

The Project researches the value and applicability of technology in basic literacy instruction, and disseminates the results.

**Incentive Grants**

The Project stimulates the use of technology by providing incentive grants to existing literacy programs.

## ORGANIZATIONAL STRUCTURE AND DESIGN

The F.R. Bigelow Foundation provided the planning and initial start-up costs for this project. Ongoing operating funds are provided by the F.R. Bigelow Foundation, Cowles Media Foundation, Mardag Foundation, Northwest Area Foundation, The St. Paul Companies, Inc., The Saint Paul Foundation, and the St. Paul Public Schools. Each of these organizations provided substantial financial assistance and has made a major contribution to the design and governance of project activities.

The governing body for the Project is the Donor Review Board. Representatives from each of the major funders sit on the board, which oversees the Project's implementation, reviews evaluation findings, and

makes funding decisions. The Donor Review Board makes final decisions about the future of the project and its own continued involvement.

The Technology for Literacy Center (TLC) is the physical location for project operations and administration. There are four project components: direct service, training, research, and incentive grants are all part of the activities at TLC. The St. Paul School District receives project funds for three of the four components: direct service, training, and research. The incentive grant and evaluation funds are administered through the supporting foundations.

The St. Paul Public Schools serves as the fiscal and management agent for TLC. The center manager reports to St. Paul Schools' director of community education. The Schools' involvement with the Technology for Literacy Project occurs at all levels through providing direct support in the areas of accounting, personnel, purchasing, maintenance, reprographics, public relations, and administration.

TLC has received additional grants and funds from the Gannett Foundation, Junior League of St. Paul, and other groups as part of collaborative literacy projects. Private businesses and individuals have made contributions to the Technology for Literacy Project, as well. The public/private partnerships assured that community interest and support were broadly based from the outset.

The original proposal called for a total three-year budget of $1.34 million for the Technology for Literacy Project. That figure was revised upwards to $1.6 million for a three-year period as additional needs were identified. The actual operating budget of TLC averages $400,000 annually. Of that figure, supporting foundations provide two-thirds and

one-third is generated by the local tax levy for community education. Major cost efficiencies result from the alliance with the St. Paul Public Schools, the use of volunteers, and donations to the Project.

## PROJECT IMPLEMENTATION

### Target population

The Technology for Literacy Project is designed to serve adults whose basic skills in reading, writing, or math are below high school completion level, with the primary focus on adults with reading and math skills below an eighth-grade level. It was designed to serve 300 students in its first year of operation, and 500 in each subsequent year, for a total of 1,300 students over a three-year period.

Enrollment in the project was 798 students between June, 1985 and July, 1986. In its second year of operation, TLC enrolled 909 adult learners.

### Marketing and recruiting

During the planning phase of TLC, advice was sought from professionals in the areas of marketing and recruiting. The marketing and recruiting plan had three major foci: recruitment of the target population of students, recruitment of volunteers, and community awareness and support. The plan was developed with the aid of the St. Paul Community Education Advisory Council, which made recommendations on how to attract the target population.

Prior to the Center's opening, open houses were held for significant community groups, such as the ministerial association, social service organizations, school personnel, neighborhood associations, and service

clubs. A press conference was hosted by the mayor of St. Paul and the superintendent of the St. Paul Public Schools.

The initial marketing and recruiting was so successful, that Center marketing activities have been limited to maintaining and replacing students and tutors, rather than increasing their numbers. The long-range marketing plan that was developed was not implemented.

**Site selection**

Selecting an appropriate location was viewed as a major decision from the outset. Factors considered in the site selection process were accessibility, security, proximity of other social service agencies, cost of remodeling, and rental. Demographic data were used to identify areas exhibiting the greatest need, namely those with low income, high density, and low educational completion rates. During the planning year, the search was narrowed to five sites.

Selection of a neutral non-public school location was a critical factor in designing a center for functionally illiterate adults. Although community support for the project was indicated by offers of church and school sites, the location selected for TLC is in a shopping mall that has experienced considerable turnover of retail clientele. The area might be described as "inner city", located in a low income neighborhood. The Center's location has ample parking, is serviced by city buslines, and is accessible to handicapped.

**Center design**

The design of the Center was based on the space limitations (3,400 square feet), the design of the ABLE Center, and the recommendations of the planning committee. The St. Paul Schools provided an architect to

design the layout, negotiate with the leasing agent, and provide on-site supervision of the remodeling activities.

Significant features include offices for teachers to make phone calls and have private conversations with students; a reading room filled with material donated by the community; a computer room housing the bulk of the technology; adjacent meeting rooms for tutors and small group instruction; a lounge for staff and tutors; secure storage facilities; and restrooms for staff and students.

## PROJECT OPERATION

### Curriculum design

The curriculum design for TLC combines the use of technology with existing methodologies of literacy instruction. An adult's prior learning experiences, present needs, and future goals are considered in forming an individual learning plan for each student.

A student's first visit includes orientation to the Center, delivered via videotape; goal setting, conducted by an adult literacy instructor; and a hands-on computer experience. New learners are scheduled throughout the day for intake, which takes one hour. The orientation videotape describes the Center's purpose and operation, giving basic information students need, such as the Center's hours of operation, description of staff, and an overview of the instructional program.

A professional assessment of student needs, ability, educational history, and goals is used to design an individual learning plan. This screening is used to determine the appropriateness of the person for TLC's program. If students are at too high a level or need special

services, they will be referred to other agencies during the intake process.

The computer experience is designed to be fun and easy, and does not necessarily reflect the learner's course of instruction. It is designed to provide an immediate, successful experience using a computer.

The individual learning plan is developed by the instructor using information gathered during intake and from results of the Test of Adult Basic Education, which the students take during their second visit. Decisions shaping the plan include whether students require tutors (for those below a fourth-grade reading level), want to pursue the GED, are requesting instruction in math or reading, and how much time they will commit to instruction. (A minimum of four hours per week in instruction at the Center is requested.)

The Center's initial curriculum incorporated Control Data's PLATO system and the Laubach method of tutoring low-level readers. As instructors at TLC became familiar with these instructional systems and learners' needs, additional software was purchased to enhance the curriculum and replace materials that were considered inadequate for TLC's competency-based program built on a mastery system of instruction.

The following activities are available for a student's learning plan: PLATO Basic Skills instruction, Computer Curriculum Corporation (CCC) materials, software designed for Apple computers, video instruction, Laubach tutoring, and small-group instruction. Classes are held on specific topics and incorporate technology as part of the instruction. For example, writing classes use word processing to teach basic writing skills.

Student progress is measured through criterion-referenced testing and standardized post-testing. The curriculum is divided into "courses" that provide clear points for post-testing to occur. Most of the software programs also include testing as part of the instructional package.

**Staffing**

TLC operates with two professional adult education teachers on duty at all times. The professional staff are fully licensed by the state in the area of adult education. They are recruited for their expertise in adult literacy and, when possible, technology. TLC's full-time staff includes a lead teacher, who is responsible for scheduling and coordinating the direct service component; a curriculum developer, who is responsible for the overall curriculum design; and a reading specialist, who supervises the volunteer component and the program's reading activities. These staff members split their full-time duties between program development and teaching. There are approximately ten part-time instructors who work widely varying schedules to accommodate the Center's hours of operation, which are 9 a.m. to 9 p.m., Monday through Thursday, with shorter hours on Friday and Saturday.

TLC employs a volunteer coordinator to recruit and coordinate the activities of more than 60 volunteers. An educational assistant administers standardized tests to students and conducts data collection. The Center employs both a full-time secretary and receptionist. There are numerous other part-time assistants. All staff report to the project director (who also performs the duties of center manager), who is ultimately responsible for the Project's implementation.

Staffing is significantly different from that projected in the original proposal. Over time, roles have changed to accommodate the Project's changing demands and needs. For example, because of the dramatic increase in numbers of students over anticipated enrollment, two instructors, rather than one, are required to operate the Center efficiently. The original proposal called for a counselor and a programmer. The project lacked sufficient funds to hire a counselor, and had insufficient demand for a programmer. The reading specialist was added after the first year of operation, due to a need for specialized attention in that area. The project's evaluation required additional staff for data collection and entry.

**Evaluation**

The evaluation design was developed after the Project's goals had been determined, but prior to its implementation. Guidelines for literacy evaluation and reports from other literacy projects provided useful information to the formative evaluator for designing the Technology for Literacy Project evaluation.

The formative evaluator designed systems for data collection, provided on-site advice, and conducted workshops on evaluation as part of staff training. Data collected by the formative evaluator for the Donor Review Board was analyzed and provided to the Center manager to assist in program implementation. The formative evaluator also collected data as needed to enhance program operations. Most staff were unaware that the formative evaluator was not a part of the staff, but was actually employed by the supporting foundations.

The high priority given to evaluation in the Technology for Literacy Project has had its negative aspects. The cost of the Project increased in order to conduct adequate evaluation. Project resources, such as staff time, were occasionally directed towards evaluation rather than direct service. The presence of an evaluator increased the stress level of staff during Project implementation. However, the advantages of providing systematic evaluation to a literacy project from the outset greatly outweigh the disadvantages.

The significant role that evaluation played in the design and implementation of the Technology for Literacy Project will be seen in the summative and cost effectiveness evaluation reports.

The summative evaluation was completed in the Project's second year of operation. Because of this, the staff members at TLC view the summative evaluation as a formative document, to be used to design the goals and objectives for the third year of operation. Training and research activities are expected to increase significantly during the final year of the Project.

The process of conducting a summative evaluation at TLC has provided an unexpected learning experience for all participants: staff, volunteers, and students. Few were unaffected by the experience, and most considered learning about evaluation first-hand beneficial. Evaluation has become an integral part of the learning process at the Center. It affords an opportunity to reflect upon activities in a systematic way, to tell the Center's story to others, and to plan effectively for the future.

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Mayer, Steven (1985) Guidelines for Effective Adult Literacy Programs. Minneapolis, Minn.: B. Dalton Booksellers & National Literacy Initiative.

Turner, Terilyn C. & Jean Hart (1984) Technology Assisted Literacy Project. A grant proposal to the F.R. Bigelow Foundation, St. Paul, Minn.

# The Technology For Literacy Project Evaluation Plan

*Stacey Hueftle Stockdill, Formative Evaluator*

The Technology for Literacy Project evaluation plan was based upon the philosophical principle that evaluations should be useful. The plan evolved from a number of perspectives contained in educational evaluation literature. One aspect most apparent was proposed by Scriven (1967). He suggested that evaluation purposes be distinguished between formative (evaluation used to improve a program while it is still fluid by providing feedback to the developer) and summative (evaluation of a completed project used to assess its overall merit).

The purposes of the formative evaluation are (1) to develop and monitor a variety of data collection methods; (2) to identify strengths, weaknesses, and issues that limit the effectiveness of the project; (3) to propose corrective action; and (4) to provide a document trail of program activities and evaluation data which could be examined by the summative evaluator.

The purpose of the summative evaluation is to assess the overall merit of the project, utilizing materials collected by the formative evaluator as well as sources of information collected for summative purpose. The summative evaluator assesses the level of attainment of the goals identified in each project component and develops recommendations for program staff.

The evaluation questions addressed by the formative and summative evaluation follow. The primary focus of the evaluations was on the direct service questions:

**Direct service**

- Recruitment--Is TLC attracting the target population?
- Achievement--Are TLC students making progress in reaching their goals?
- Retention--Is TLC retaining students?

Additional question addressed were--

**Training**

- To what extent and how successful has TLC been in informing basic skills instructors on the use of microcomputers, increasing the use of technology-assisted instruction by existing literacy programs, and facilitating cooperative efforts among literacy providers?

**Incentive grants**

- To what extent has TLC stimulated the use of technology by other literacy programs?

**Research grants**

- To what extent has TLC provided a laboratory for research on the use of technology with functionally illiterate adults?

**In general**

- What are the strengths of the TLC project? How can they be built upon?
- What are the weakness of the TLC project? How can they be addressed?

A number of data collection methods were identified to assess if students were making progress. A standardized achievement test was selected to determine if students' skills improved with treatment. Changes in grade levels and hours required for one grade level change were used as primary indicators of success because they are the only indicators used consistently in adult basic education programs. Daily logs were developed in which instructors recorded how much time learners spent on each course.

There was concern that the standardized test, while allowing for comparisons with other programs, might not accurately assess the degree to which learners mastered the materials studied. Criterion-referenced tests were developed by project staff to assess the degree to which learners met learning objectives. These were developed during the second year when the project had a standardized curriculum.

Achievement was also assessed through qualitative methods. Recognizing that learners would experience life-changes that would not be captured by the quantitative testing instruments, qualitative data was collected through group interviews, exit interviews, student questionnaires, learner activity logs, and case studies.

Telephone interviews and follow-up letters were used to collect data on why learners left TLC and identify ways the program could be improved. In addition, questionnaires were distributed to learners, staff, instructors, and volunteers twice a year to identify program strengths and weaknesses.

To monitor training activities, staff members were asked to record all training activities. Mailing addresses were kept to identify who

received information on TLC. A guest book was used to record the visitors to TLC and their affiliations. Meeting agendas, lists of contacts regarding possible research projects, and project proposals were collected to document research activities.

The formative evaluator's role was expanded in the incentive grant component from that in the original design to include working with each funded project, developing an individualized evaluation plan, assisting in the development of data collection techniques, and monitoring project progress.

As the evaluation evolved, it became apparent that funders were also interested in the costs associated with using technology in literacy efforts. A cost component was added to the evaluation design. This cost descriptive study describes the various cost components, collects detailed information regarding project costs, suggests needed improvements in project design, and identifies average and incremental costs on various per unit bases (e.g., costs per student hour of instruction).

The evaluations were funded by the F.R. Bigelow Foundation and administered by the Saint Paul Foundation. This design is contrary to evaluation literature's recommendation of locating the formative evaluator internally in the project hierarchy. Funders wanted assurances that the formative evaluator remained objective and believed this could be achieved by retaining financial and administrative control. The formative evaluator also reported to the Donor Review Board every six months. This organizational structure and reporting requirement resulted in funders' learning the intricacies involved in developing the project, understanding the literacy and measurement issues addressed by project

and evaluation staff, and perceiving the information received to be credible as they were given opportunities to examine formative data as it was collected. External summative and cost evaluations provided further assurance of the validity of formative data as it was collected.

The Technology for Literacy Project evaluation exemplifies a comprehensive plan that includes formative, summative, and cost evaluations. It was possible because funders were truly interested in learning from the project and were willing to commit resources to evaluation. The full integration of evaluation into the project was achieved because project staff members were willing to collect data and learn about evaluation.

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# Summative External Evaluation of the Technology for Literacy Project

*Michael Quinn Patton, Summative Evaluator*
*with Stacey Hueftle Stockdill, Formative Evaluator*

**What is a summative evaluation?**

A summative external evaluation is conducted to independently assess the effectiveness of a project. A summative evaluation typically examines both project implementation and outcomes. The evaluation takes place at a point when the initial start-up and development period is over so that the project has reached a reasonable level of stability in its functioning and consistency in its operation. Among evaluators, summative evaluation is distinguished from "formative" evaluation which is aimed at improving program operations during the period of development. A summative evaluation assesses the extent to which a project is doing what it set out to do and is having a demonstrable and desirable impact on program participants. A summative evaluation, then, focuses on whether the program is sufficiently effective and cost-effective to merit continuation and, where appropriate, expansion and dissemination. A summative evaluation is typically conducted by someone external to and independent of the program to increase the credibility and objectivity of the report.

This evaluation focuses on participants in the Technology for Literacy Center who enrolled between September 1, 1986 and November 30, 1986. This is essentially the period from Labor Day through Thanksgiving. During that time 165 new learners came into the

Technology for Literacy Center. Data on program participation and achievements will be examined for those participants.

It is helpful to understand this summative evaluation time period in terms of the overall development of the Technology for Literacy Center. The Center's plans were developed in 1984. The Center was funded in January, 1985, and began taking in and working with participants at the end of May, 1985. During the period from May, 1985 through August, 1986, a great deal of program development took place, including working out effective recruitment approaches, intake procedures, software purchases and development, hardware installations, staff development and curriculum development. By the beginning of the summative evaluation in September, 1985 (16 months after beginning instruction), the Center's Donor Review Board and staff felt confident that the core elements of the project were in place and that the Center had achieved sufficient stability and consistency to be subjected to a formal and independent summative evaluation. During the entire developmental period, the Center was heavily involved in formative evaluation aimed at program improvements and increased effectiveness. During the summative evaluation period, no major changes in program delivery, operations or recruitment occurred.

This report, then, is an assessment of the operations and outcomes of the Technology for Literacy Project with special focus on the Technology for Literacy Center.

**Project overview**

The Technology for Literacy Center (TLC) is the centerpiece of the Technology for Literacy Project. TLC is the direct service component of

the project, and as such is the primary focus of this evaluation. In addition, the evaluation also examined the three other major elements of the overall Project:

* Training basic skill instructors in the use of technology throughout the metropolitan area of the Twin Cities.
* Incentive grants to stimulate the use of technology in existing literacy programs in the metropolitan Twin Cities area.
* Research on the value and applicability of technology in basic literacy instruction.

The context for the Technology for Literacy Project is the national attention currently being focused on the problem of functional illiteracy. The Project proposal and background documents summarize research on the nature of the problem as follows:

> Twenty-three million people lack the basic reading and writing skills needed to function effectively in our society. An additional thirty million are estimated to be only marginally able to cope with the demands of daily life....One out of every five adults is functionally illiterate and lacks the basic competencies needed to cope with contemporary society. Reading job notices, making change, applying for a driver's license, and reading classified ads were competencies identified in the study. Over 20% of those studied were judged not competent in the specific area of reading.
>
> The national cost of illiteracy has been estimated at six billion dollars yearly in welfare programs and unemployment compensation. The loss of employment for functional illiterates is estimated at an additional 237 billion dollars a year. Illiteracy is linked to a host of other problems, including crime, violence, and family abuse.
>
> In Minnesota approximately 27% of the adults 25 years of age and over do not have a high school diploma, according to the 1980 Census. This means that in the Twin City metropolitan area approximately 225,000 people do not have these necessary credentials. Moreover, 13% of those who have a high school diploma may be considered functionally illiterate. (Quoted from the Project Proposal.)

The Technology for Literacy Project is a response to the problems of widespread functional illiteracy. The Technology for Literacy Project, including the Center, is funded and sponsored by the following organizations: The F.R. Bigelow Foundation; The Saint Paul Foundation; The Mardag Foundation; The Northwest Area Foundation; The Cowles Media Foundation; the St. Paul Companies; and the St. Paul Public Schools. TLC is administered by the St. Paul Public Schools, Department of Community Education. Project staff is employed by the St. Paul Public Schools. The Project Manager is responsible to the St. Paul Public School's Director of Community Education. Community and donor involvement in the Project includes (1) a Donor Review Board which has final approval on Project policy, (2) a Program Advisory Committee which makes recommendations regarding Project implementation and provides a liaison with education/service/governmental organizations interested in adult literacy, and (3) various subcommittees which bring special expertise to the Project components.

## PROGRAM IMPLEMENTATION: KEY COMPONENTS OF THE TECHNOLOGY FOR LITERACY CENTER

The Project proposal, Project reports and Center documents describe in detail the literacy education approach of the Technology for Literacy Center. The purpose of this section is to validate the actual implementation of key Center components. Such validation is an important summative evaluation function because evaluators often find that actual project implementation is quite different from what was supposed to happen. This implementation validation is based on site visits

and observations, interviews with participants, interviews with staff, and examination of select Project files and documents.

**Recruitment**

The original proposal projected serving 300 learners the first year and 500 learners each additional year. In actuality, the Center had 798 learners the first year, 266% above the original projection. The second year (June 1, 1986 through May 30, 1987) the Center has served 909 learners, 185% above the original projection. Over two years, then, TLC has served 1,424 learners.

**Intake**

Potential TLC participants view an orientation videotape explaining the program, have a computer experience, and meet with an instructor to identify needs, educational history, ability and goals. During the second visit, a standardized test is taken for appropriate placement. The program averaged 17 intakes a week during the first year.

**Target population**

The Center is designed to serve adults 18 years of age and over in the St. Paul tri-county area with basic skills below high school graduation level. Priority was to be given to English-speaking adults with reading and math skills below a sixth grade level. In actuality:

* All participants are adults
* 74% of all participants scored below 8th grade at intake
* 81% of the summative evaluation group (September-November, 1986, N=165) tested below the 8th grade level.
* 94% of participants are from the St. Paul tri-county area
* 78% of all learners were native English speakers

The Center set out to attract functional illiterates who have not previously sought assistance as well as those who have tried other approaches with success.

* 44% of all participants had not previously sought help
* 41% of the summative evaluation group had not previously sought help

The Center has attracted learners of diverse ethnic backgrounds.

| | First Year | Summative Evaluation Group | Second Year |
|---|---|---|---|
| Asian | 5% | 5% | 4% |
| Black | 35% | 28% | 29% |
| Caucasian | 47% | 51% | 56% |
| Hispanic | 9% | 8% | 6% |
| Native American | 2% | 5% | 2% |
| Other/no response | 3% | 4% | 2% |

Additional data on the demographic and background characteristics of participants are included in Table I later in this report.

**Testing and placement**

All students are given the TABE test as a timed pretest. The test is individually administered by one trained staff person. A posttest is given after the learner completes a course.

An Individual Learning Plan (ILP) is then prepared based on the student's goals, needs and test results. Student goals vary as shown by these first-year goals:

| | |
|---|---|
| Improve reading | 68% |
| Improve math | 70% |
| Improve writing | 45% |
| GED | 38% |
| Improve English language (ESLs) | 6% |

**Instruction**

Reading below the fourth-grade level (Basic Reading) is based on the Laubach program with individually assigned volunteer tutors and computer programs available for supplemental reinforcement.

Reading above the fourth grade level is primarily computer-based using PLATO and CCC (Computer Curriculum Consortium Company), and Apple software with supplementary books and materials available.

The math instruction is computer-based using PLATO, CCC and ICT programs.

The curriculum is organized in courses made up of modules. Criterion-referenced tests document progress through modules and courses. A certificate is presented upon completion of a course. The course and curriculum development work of TLC staff has centered on integrating the different software programs with appropriate supplementary materials and organizing the resultant modules into meaningful sequences and courses.

During the period of the summative evaluation the math curriculum was very stable and the reading core was stable.

**Process**

Students log in and log out each time they come to the Center. Time is tracked in fifteen minute increments. After the individual plan is developed, students using computers can work at their own pace as long and as often as they desire. Basic reading students are assigned a volunteer tutor based on when they can come to the Center. There are always instructors on the floor to assist students and to review their progress as they complete modules or courses.

During the first year the average active learner spent 36 hours at the Center with the average visit being 1.6 hours.

Monitoring and evaluation

Each student has a file with standardized forms for tracking progress and for instructor comments. The file is updated each time a student visits the Center. The file also contains intake data and test scores. Student hours are recorded in the file. On a quarterly basis the student intake and progress data are aggregated. Data on student progress for the summative evaluation period are summarized below.

September 1 - November 30, 1986

| Total number of new learners | 165 | Percentages |
|---|---|---|
| Concentration | | |
| Reading | 23 | 14% |
| Reading (grades 5-12) | 60 | 36% |
| Math | 27 | 16% |
| Reading and math | 11 | 7% |
| Other | 8 | 5% |
| Intake only | 36 | 22% |
| | 165 | 100% |

Among the 129 students during the summative evaluation period (excluding those who came through intake only), 55 modules and 22 courses were completed.

This report will refer to specific data under special topics as appropriate, especially outcomes and achievement data. The point here is to validate that an extensive monitoring and comprehensive formative evaluation system has been in operation from the very beginning for (1) tracking individual student progress and (2) aggregating total program statistics. Follow-up data are collected on drop-outs via telephone interviews. Questionnaires are used to evaluate student, volunteer and

staff reactions to their experiences twice each year. Those data will be discussed later in this report.

**Staffing**

During the summative evaluation period the Center had the following staff.

Center director (full-time)
3 full-time instructional staff
8 part-time instructors
5 part-time program assistants
2 secretaries

The instructional staff include a curriculum developer, reading specialist, lead instructor, and volunteer coordinator.

There were 47 active volunteers during the summative period, each of whom had received the 12 hours of basic training Laubach workshops required by TLC and the Minnesota Literacy Council, plus 3 hours additional training on computers and TLC.

**Place and hours of operation**

The Technology for Literacy Center operates in the Unidale Shopping Mall about one mile west of downtown St. Paul, two blocks north of a major exit for Interstate 94. This is a lower income area of the city.

The Center is open during the following hours:

9 a.m. - 9 p.m. Monday through Thursday

9 a.m. - 5 p.m. Friday

9 a.m. - 3 p.m. Saturday

The Center has a glass front which looks in on the reception area. The entire Center space is clean, brightly lit and neat. The reception area opens into a large room with computer cubicles. During the

summative evaluation period the Center had the following computer equipment in operation:

| | |
|---|---|
| 10 | Apple IIe computers |
| 1 | Macintosh computer |
| 4 | printers |
| 8 | CDC Viking 110 computers for delivery of PLATO courseware |
| 4 | Atari 1040ST computers for delivery of CCC courseware |
| 3 | Zenith monitors |
| 2 | Mitsubishi videocassette players |
| 1 | filmstrip viewer |
| 1 | Sentry 2050 test corrector |

During the summative evaluation period the use of the space by students during peak morning and evening hours was reaching capacity.

## OUTCOMES: LITERACY GAINS

Measuring literacy gains is a matter of some difficulty and controversy. There is no universally accepted definition of functional literacy. There are substantive, administrative and statistical problems with both norm-referenced and criterion-referenced standardized achievement tests. There are also problems in deciding what comparisons to make: to what programs or groups should TLC be compared using what measures of comparison?

The result of these difficulties is that no one single indicator can be trusted to fairly, accurately and usefully capture program outcomes. The program's impact cannot be reduced to any single bottom line, as attractive as such a notion might be. Instead, it is necessary to create an outcomes mosaic or tapestry made up of several different outcome indicators and comparisons. We can then stand back and view the program impact picture as a whole.

Our primary focus will be on the learners who came into the program during the summative evaluation sampling period, September 1 through November 30, 1986. Program procedures and instruction were highly stable, consistent and identifiable during this period. No unusual efforts were made in any aspect of the program that would distort or boost outcomes.

There are some significant differences between the background characteristics of the summative evaluation group and the profile of all program participants. Table I shows comparisons for year one, year two, the summative evaluation group, re-entry students (first year drop-outs who returned in year two and active carryovers from year one to year two), the total population without the summative group, and the total TLC population (May 29, 1986 - May 30, 1987) including the summative group. The summative group had more learners employed outside the home (55%) versus either years one or two without the summative group (44%). The summative group had more learners who tested below 8th grade at intake (81%) than year one (75%) or year two without the summative group (69%). Similarly, the summative group had more learners who had been told they had a learning problem or had been placed in a special class (52%) than year one (35%) or year two without the summative group (41%). The summative group was reasonably representative of all TLC learners with regard to gender; percent minority; first adult literacy program; age; residence; percent high school graduates; and English as a second language.

TABLE I
COMPARISONS OF LEARNER CHARACTERISTICS FOR DIFFERENT TIME PERIODS

| | Year One (5/5/85-5/31/86) | Re-entries | Summative Evalution Period (9/1/86-11/30/86) | Two Year Total Without Summative Group | Two Year Total With Summative Group | Two Year Total with Summative and Reentry | Total Program (Years 1 and 2) Including Summative Group |
|---|---|---|---|---|---|---|---|
| Number enrolled | 798 | 283 | 165 | 461 | 626 | 909 | 1424 |
| Percent minority | 51% | 53% | 48% | 42% | 44% | 47% | 48% |
| Employed outside of the home | 44% | 46% | 55% | 44% | 47% | 46% | 45% |
| Age 18-39 | 74% | 69% | 81% | 80% | 80% | 77% | 77% |
| First adult literacy program | 46% | 39% | 41% | 41% | 41% | 40% | 44% |
| Resident of Ramsey, Dakota or Washington Counties | 95% | 97% | 94% | 93% | 94% | 95% | 94% |
| % high school graduates | 40% | 41% | 41% | 43% | 42% | 42% | 41% |
| % at or below 8th grade education | 15% | 19% | 12% | 11% | 11% | 14% | 13% |
| % tested at or below 8th grade | 75% | 78% | 81% | 69% | 72% | 74% | 74% |
| Gender (% female) | 50% | 45% | 49% | 48% | 48% | 47% | 49% |
| English as a second language | 13% | 13% | 12% | 9% | 10% | 11% | 12% |
| On Public Assistance | 41% | 41% | 35% | 41% | 39% | 40% | 40% |
| Told has a learning problem or placed in special classes | 35% | 38% | 52% | 41% | 44% | 42% | 39% |

*Note: Re-entries are year one drop-outs who returned in year two.

Achievement test gains

The primary summative evaluation strategy focused on measuring achievement gains on the timed TABE test for all active students who enrolled during the summative period. (The TABE is the Test of Adult Basic Education, a norm-referenced standardized achievement test developed by CTB/McGraw-Hill as an adaptation for adults of the California Achievement Test. The reading test takes an average of 80 minutes and raw scores can be converted into grade-level equivalents.) During the summative evaluation period, the TABE was administered as usual as part of intake. This constituted the pretest for the summative group. Subsequently, in April, all active students in the summative group were given the TABE again if they had logged twelve or more hours at TLC. This constituted the posttest for the summative group. A posttest at this point in time is not the usual procedure at TLC. Rather, these posttests were specially administered to measure the progress of the summative group. The results will be presented in three ways:

(1) achievement gains for basic reading, other reading, and math groups for the summative groups above;
(2) comparison of basic reading gains to a control group; and
(3) comparisons to other local and nationally recognized programs.

Fifty students in the summative group of 165 were active with more than 12 hours of instruction in April. (A later section of this report will discuss data on drop-outs and students with fewer than 12 hours of participation.) This group of fifty is the primary focus for measuring achievement outcomes. Table II shows the achievement test gains for the summative group.

There were 15 learners in the Basic Reading Program tested during the summative evaluation period. They spent an average of 47 hours at TLC. Their composite reading gain was three-fourths (.75) of a grade level; the comprehension gain was nearly one full grade level; and the vocabulary gain was six-tenths (.6) of a grade level. The composite score is the combination of the comprehension gain and the vocabulary gain. Thus, these results show that TLC is much more effective in increasing comprehension compared to vocabulary gains.

These gains are averages (means) for the fifteen learners. It is possible to extrapolate these results to determine how long, on average, it takes a learner to progress one full grade level as measured by the standardized achievement test. The results indicate that the fastest progress is in comprehension, where on average 48 hours of participation leads to one grade-level gain. A full grade-level gain in vocabulary takes an average of nearly 79 hours. The composite reading gain results show 63 hours for one grade-level gain in the Basic Reading group.

Learners in the reading program for grades 5 through 12 are also presented in Table II. There were 23 learners in this group. Their composite reading gain was, on average, 85% of a full grade level. The comprehension gain was 110% of a grade level (1.1 grade-level gain); and the vocabulary gain was nearly eight-tenths (.8). Again, these results show greater TLC impact on reading comprehension than vocabulary.

To progress one full grade level in reading comprehension this group needed, on average, 40 hours of TLC instruction. A full grade level gain in vocabulary took about 57 hours. The composite reading gain

TABLE II

GRADE LEVEL CHANGES BY HOURS OF INSTRUCTION

1. Basic Reading Group (Grades 0-4 pretest): 15 learners - 47.2 average hours at TLC

   Composite reading gain .75 grade level
   63.2 hours per full grade level change

   Comprehension gain .98 grade level
   48.2 hours per full grade level change

   Vocabulary gain .6 grade level
   78.7 hours per full grade level change

2. Other Reading Group (grades 5-12 pretest): 23 learners - 44.5 hours at TLC (mean)

   Composite Reading Gain .85 grade level (mean)
   52.5 hours per full grade level change

   Comprehension gain 1.13 grade level
   39.6 hours per full grade level change

   Vocabulary Reading gain .79 grade level
   56.6 hours per full grade level change

3. Math - all levels: 19 learners - 32.7 hours at TLC (mean)

   Composite Math gain .72 grade level
   45.4 hours per full grade level change

   Concepts/problems gain .68 grade level
   48.2 hours per full grade level change

   Computation gain .8 grade level
   40.6 hours per full grade level change

Explanatory notes: All numbers are means. The test used was the timed TABE.

(comprehension and vocabulary) took 52.5 hours for a full grade-level change.

There were 19 learners with posttests in math during the summative evaluation period. They spent an average of about 33 hours at TLC. The composite math score is made up of two parts: computation gain and concepts-problems gain. These learners showed two-thirds (.68) of a grade-level gain in concepts-problems; eight-tenths (.8) of a grade-level gain in computation; and just over seven-tenths (.7) grade-level gain in the composite score.

On average, it took just over 40 hours for a full grade-level gain in computation. It took 48 hours for a full grade-level gain in concepts and problems. It took 45 hours for a full grade-level math change in the composite score.

**Variations in achievement and instructional hours: Evidence of individualization**

The previous section has presented average (mean) gain scores and average hours per full grade level of achievement. These results provide a rough indication of average learner progress at TLC. These results must be interpreted with caution, however, because the data on variations in achievement and instructional hours lead to a very dramatic, important and significant finding: there is no average student at TLC.

To understand the ways in which averages can be deceiving, statisticians like to remind people of the story about the man who drowned in a river with an average depth of six inches.

Table III presents information for both achievement and instructional hours that provide a picture of variations in the TLC experience. Table III presents means, medians, standard deviations, and range scores (lows

TABLE III

VARIATIONS IN ACHIEVEMENT AND INSTRUCTIONAL HOURS

| | ACHIEVEMENT GAIN SCORES | | | | |
|---|---|---|---|---|---|
| | Mean | Median | Standard Deviation | Range Low | High |
| Basic Reading (Grades 0-4) | | | | | |
| Composite | .75 | .6 | .53 | 0 | to 1.6 |
| Comprehension | .95 | 1.0 | 1.0 | -.2 | to 3.4 |
| Vocabulary | .6 | .2 | .74 | -.4 | to 1.8 |
| Hours | 47.2 | 39 | 23.5 | 16.8 | to 101 |
| Advanced Reading (Grade 5-12) | | | | | |
| Composite | .85 | .7 | 1.2 | -1.8 | to 3.5 |
| Comprehension | 1.13 | 1.0 | 1.8 | -2.1 | to 4.8 |
| Vocabulary | .79 | .8 | 1.4 | -1.4 | to 4.6 |
| Hours | 44.5 | 34 | 31.08 | 13.75 | to 145 |
| Math | | | | | |
| Composite | .72 | .6 | .93 | -.8 | to 2.7 |
| Computation | .81 | .41 | .37 | -1.2 | to 4.2 |
| Concepts/ Problems | .68 | .71 | .23 | -2.4 | to 3.1 |
| Hours | 32.7 | 16.5 | 44.6 | 1.75 | to 182 |

CORRELATIONS
BETWEEN ACHIEVEMENT GAINS
AND INSTRUCTIONAL HOURS

| | |
|---|---|
| Basic Reading Group | r = .25 |
| Advanced Reading | r = .20 |
| Math | r = .40 |
| All program areas | r = .28 |

and highs). A mean score is the statistical average. The median score is the middle score when the individual scores are arranged in order from low to high; half of the scores must therefore be above the median and half must be below the median. The standard deviation is an indicator of how great the overall statistical variation is around the mean; two-thirds of the learners will fall within one standard deviation of the mean. The greater the standard deviation, the greater the variation in the learner group. The range scores show how much distance there was between the lowest score and the highest score. These lows and highs can have a significant impact upon the calculation of the statistical mean. For groups with relatively little variation where scores are fairly closely distributed around the mean, the standard deviation will be smaller than the mean. For groups where there is a great deal of variation and where scores are spread out over a considerable distance from the mean, the standard deviation will be greater than the mean. Of the nine different gain scores shown on Table III, in only one case (composite basic reading) is the standard deviation less than the mean.

Another indicator of great variability is the difference between the mean and the median. In groups with an evenly distributed normal curve the mean and median will be nearly the same. In groups with skewed or uneven distributions, the median and mean will be different. Table III shows that there are considerable differences between means and medians for instructional hours.

Most revealing about variations, however, may be the range scores. The range scores show the highest and lowest score in each group. Thus, in each one of the groups except the Basic Reading composite score,

there were learners who showed negative change scores. For example, in math concepts and problems one student fell two and four-tenths (-2.4) grade levels. This same student showed four-tenths (.4) grade-level increase in math computation. This student had spent less than five hours in the math instructional program and had devoted all of that time to studying division.

Another student, by way of contrast, spent nine hours at TLC but showed the greatest grade-level change (+4.2) in computation and a large grade-level gain (+4.2) in concepts and problems for a composite gain of two and one-half grade levels in math. The student with the largest number of hours in math instruction (182 hours over 48 days) showed an average grade-level gain (1.2 grade-level increase on the composite). The student with the fewest number of hours (1.75 hours) on just one day studying fractions, showed a seven-tenths (.7) gain in concepts and problems and a one and two-tenths (-1.2) decline in computation for an overall grade-level decline of three-tenths (-.3).

To further understand the variation in math, consider the cases of the two students who were closest to the average for math hours and also fairly close to each other on pretest scores. The first student had a composite math pretest score of 6.9 with a one grade-level increase based on 35 hours of instruction over 10 days. The second student had a pretest score of 7.4 with a .4 increase based on 36 hours of instruction over 20 days. The first student concentrated on fractions and decimals while the second concentrated on multiplication, division, and fractions. Only two hours separated their instructional time at TLC, but the grade-level change for the first student was more than double the grade-level

change for the second student. The concentration of time in 10 days was twice that for the first student compared to the second student.

The point here is by reviewing each of the math programs for the 19 math learners in the summative evaluation group it becomes clear that each case is relatively unique. TLC has created a highly individualized program where learners can proceed at their own pace based on specific needs and interest. The students come in at very different levels and make very different gains during their TLC work. With a relatively small size, therefore, it is important to avoid placing too much emphasis on an average gain score or average hours of instruction.

To further illustrate this point, it is instructive to look at the reading program. All of the reading participants in the summative evaluation group had more than 12 hours of reading instruction at TLC. Nevertheless, there is still substantial variation. (The greatest variation in hours was found in the math program. Moreover, the math group includes seven learners with fewer than 12 hours in math instruction at TLC.)

In the Basic Reading group (grades 0-4), the time in reading instruction varied from 17 to 101 hours. The student with just 17 hours had a pretest composite score of 3.5 and a posttest composite of 4.0 for a one-half grade-level gain in reading. The student with the largest number of hours of Basic Reading instruction (101 hours) had a pretest composite score of 3.2 and a posttest score of 4.1 for a grade-level gain of nine-tenths (.9). With nearly six times more instruction at TLC the second learner achieved less than twice as much of an increase.

The learner with the largest gain score in the Basic Reading group gained 1.6 grade levels in 26 hours of instruction. Two Basic Reading learners showed no change on the standardized achievement test; one of these learners had spent 38 hours at TLC and the other 53 hours. By contrast, another learner gained one and one-half grade levels (1.5) in 36 hours of instruction.

There is similar variation in the reading program for grades 5-12. The learner with the highest gain score (+3.5 grade levels) had 31 hours of TLC instruction over 23 days. By contrast, another learner had 60 hours of instruction over 18 days, but had eight-tenths grade-level decline (-.8) in reading. The student with the largest number of hours in this group (145 hours over 75 days) had a modest 1.2 grade-level increase on the composite score while another student who spent only one-third of that time (53 hours) had nearly a two grade-level increase (1.9) on the composite reading score.

As one might expect, given this variation, the correlation between number of hours of instruction and achievement is relatively low. Table III shows the correlations for each program area. For the Basic Reading group, the correlation is .25. For the other reading group, the correlation is .20. For math it is somewhat higher, .40. The overall correlation between achievement gain and instructional hours is .28 for all program areas and all participants. In comparison to other educational phenomenon, these correlations are relatively weak. A correlation of 0 would mean no relationship between hours of instruction and achievement. A correlation of 1.0 would mean a perfect relationship such that increased hours always lead to a standard increase in achievement. As the reader

can see, the actual results fall towards the lower end of the possible correlation scores. This is another indicator of the great variation and diversity in TLC.

What does all this variation mean? Is it good or bad?

These results mean that TLC is a genuinely individualized program, self-paced, serving a very diverse population of learners. One should expect that there will be tremendous variation in progress when the group includes the following kinds of diversity: about half the learners having been in special classes or told that they had a learning problem; over one-third on public assistance and nearly one-half unemployed; 41% percent for whom this is their first adult literacy experience; and nearly 60% who are not high school graduates.

It is also clear from staff interviews that many of these students have very high test anxiety and so, although they are making progress in moving through modules and courses, they may still do poorly under the pressurized situation of the standardized test. Some students can benefit from a modest amount of instruction, much of which may be on the order of refresher work, and, with good test taking skills, can show substantial gains. Nor is the standardized achievement test an ideal reflection of the instructional curriculum. The composite reading score gives substantial weight to vocabulary achievement although the TLC instructional program emphasizes comprehension much more than vocabulary. TLC is not, therefore, simply teaching to the test.

Given that TLC set out to be a highly individualized program serving students of great need and attempting to attract the full range of possible students, these data on variations can be taken as affirmation

that TLC is operating as intended. It would be very easy to make dramatic increases in number of hours per grade-level achievement by working with only the more promising students and by teaching more directly to the standardized achievement test. Such an approach, however, would not be in keeping with TLC philosophy and goals.

In summary, then, these statistics on variations and achievement in hours substantiate the highly individualized nature of TLC and the importance of not placing too much emphasis on average achievement scores or average hours of participation. It is especially important to avoid using the averages as a basis for setting student expectations. Given these results, it would be highly inappropriate to tell Basic Reading learners, for example, that in 48 hours they can expect to gain one grade level in reading comprehension. It is much more appropriate to tell learners that there is a great deal of variation between learners and how much time it takes for them to make progress in reading. It is important to keep this variation in mind as we move to comparisons between the TLC summative group and a control group, and between TLC and other programs.

## COMPARISONS

It is helpful, in order to get a broader perspective on the achievement of TLC learners, to compare the gain scores of the TLC summative group with both control groups and other programs nationally. This section shall make these comparisons. Before doing so, however, it is again worth noting that these comparisons form only one part of the overall evaluation mosaic. There are methodological and conceptual

imperfections with each comparison. Thus, it is inappropriate to give too much weight to any one of the statistical findings in this report. Overall, however, the various statistical pieces fit together to provide a picture of the relative impact of the Technology for Literacy Center.

**Comparisons between the summative groups and control groups**

Finding an appropriate control group poses certain problems. It is neither possible nor appropriate to randomly select potential participants in TLC and assign them to treatment and control groups. Ethically, TLC is committed to serving any eligible learner who walks through the door. To withhold services from a control group, therefore, was not acceptable.

The next best solution is to use as a control group those learners who go through intake but do not subsequently undertake serious instruction. By going through the files for the summative evaluation group, it was possible to identify seven learners in reading who had fewer than 12 hours of instruction at TLC. Another 13 re-entry learners were identified who had ceased participation in TLC before completing 12 hours of instruction. They subsequently re-entered TLC during the summative period and were given the standardized test for placement. The second (re-entry) test is their posttest for the purpose of this analysis. The control group for reading, then, consists of 20 learners who had fewer than 12 hours of reading instruction.

A similar search in math revealed nine learners from the summative group with no math instruction for whom "posttest" results could be obtained.

As Table IV shows, the summative evaluation group (the treatment group in TLC) and the control group were not completely equivalent on

the pre-test in reading. The control group pre-test scores averaged more than one and one-half grade levels higher than the summative group for the pre-test. These differences were significantly different for the vocabulary and composite scores.

The math pretest scores for the summative and control groups were roughly equivalent. There were no statistically significant differences in pre-test scores between the math summative and control groups.

Table V shows the gain score comparisons for the summative and control groups by reading level as well as for math. In the summative group (treatment group) gain scores based on pretest to posttest changes were significant at levels from .01 to .0001. (The significance of the pretest to posttest gain for the total summative reading group is much greater in large part because of the larger sample size when both basic and other reading groups are combined). However, the vocabulary gain scores for the control group were also significant at the .01 level, and the composite reading gain scores were significant at the .05 level. The comprehension gain scores for the control group were not, however, significant.

This analysis shows that TLC is having its greatest reading impact on comprehension for both the Basic Reading group and the other reading group (grades 5-12). The greatest changes from pretest to posttest for both reading groups are in comprehension. The control group shows no significant gain in comprehension. Therefore, the data indicate that TLC is effective in increasing the reading comprehension of participating learners compared to those who do not actively participate in the program. TLC is not particularly effective in increasing the vocabulary

of participating learners compared to the control group.

Part B of Table V shows the results for math. The greatest pretest to posttest gains are for computation. For the summative group, the average gain of .8 grade level is significant at the .01 level. The concepts and problems sub-test gain of .68 is significant at the .05 level. The composite gain of .72 is significant at the .01 level. None of the pretest to posttest comparisons for the control group are statistically significant. Therefore, the data indicate that TLC is making a significant difference in math learning among its participants compared to a control group.

There are several caveats that should be added to this analysis. The testing consultant for TABE recommended using the same form of the TABE for the first posttest but using parallel forms for subsequent administrations of the test. That is the procedure that was followed by TLC in testing. Thus, the pretest and posttest for the TABE was the same version or form of the test. Since this report is being prepared primarily for the program's Donor Review Board rather than a group of educational researchers, I have omitted a detailed discussion of methodology and statistics. Additional details of the design, methods and analysis are available from the program's internal formative evaluator, Dr. Stockdill. It suffices for the purposes of this report to note that the results are positive for TLC with regard to reading comprehension and math, but are not positive with regard to reading vocabulary.

While the results are positive, the study design is not sufficiently rigorous to draw very definitive conclusions about TLC. In terms of the total number of learners participating in TLC, the sample sizes for the

**TABLE IV**

Pretest Equivalency Comparisons
Between the Summative Group and
Control Groups in Reading and math

| | Summative Group (Treatment) | Control Group | Significant difference level (2-tailed t test) |
|---|---|---|---|
| Reading number | 38 | 20 | -- |
| Comprehension pretest means | 5.06 | 6.56 | -- |
| Vocabulary pretest means | 5.31 | 6.87 | .05 |
| Composite pretest means | 5.15 | 6.88 | .05 |
| Math number | 19 | 9 | -- |
| Computation pretest means | 6.09 | 5.8 | -- |
| Concepts/problem pretest | 5.96 | 6.1 | -- |
| Composite | 6.0 | 5.91 | -- |

TABLE V

Pretest to Posttest Gain Score Comparisons
Between the Summative and Control Groups

A. **Pretest to Posttest Comparisons for Reading**

| | Pretest Mean | Posttest Mean | Mean Grade level gain | Significance level (one-tailed + test) |
|---|---|---|---|---|
| 1. Summative Group Basic Reading (15 learners) | | | | |
| Comprehension | 2.37 | 3.32 | .95 | .01 |
| Vocabulary | 2.7 | 3.3 | .6 | .01 |
| Composite | 2.50 | 3.25 | .75 | .01 |
| 2. Summative group Other reading (23 learners) (grades 5-12) | | | | |
| Comprehension | 6.81 | 7.94 | 1.13 | .001 |
| Vocabulary | 7.01 | 7.8 | .79 | .01 |
| Composite | 6.87 | 7.72 | .85 | .01 |
| 3. Total Summative Group in Reading (38 learners) | | | | |
| Comprehension | 5.06 | 6.2 | 1.14 | .0001 |
| Vocabulary | 5.3 | 6.0 | .7 | .0003 |
| Composite | 5.15 | 5.96 | .81 | .0001 |
| 4. Control group for reading (20) | | | | |
| Comprehension | 6.56 | 6.92 | .36 | -- |
| Vocabulary | 6.87 | 7.5 | .63 | .01 |
| Composite | 6.88 | 7.31 | .43 | .05 |

B. **Pretest to Posttest comparisons for Math**

| | | | | |
|---|---|---|---|---|
| 1. Summative Group (19) | | | | |
| Computation | 6.09 | 6.90 | .805 | .01 |
| Concepts/problems | 5.96 | 6.64 | .68 | .05 |
| Composite | 6.0 | 6.72 | .72 | .01 |
| 2. Control Group (9) | | | | |
| Computation | 5.8 | 6.14 | .34 | -- |
| Concepts/problems | 6.1 | 6.24 | .11 | -- |
| Composite | 5.9 | 6.12 | .21 | -- |

summative treatment groups are relatively small and the control groups are quite small, especially the math control group with a sample size of only nine. Moreover, the previous section noted that there is tremendous variation in the TLC population and that caution must be used in interpreting means and comparisons of means. Those cautions apply to the comparisons used in this analysis.

A dramatic example of this variation emerged in studying the control group. In the original sample selected for the control group, namely those learners with fewer than 12 hours of reading instruction at TLC, one case was particularly problematic. This person showed a five-grade-level gain between the pretest and the posttest from a pretest score of grade level 7.9 to a posttest grade-level score of 12.9. This person engaged in no reading instruction following the pretest. The posttest was administered nine months after the original pre-test following re-entry into the program with no participation in instruction during the nine-month interim. Yet, the gain score was so dramatic that with a small sample size, this single gain score could significantly distort the control group findings. Further inquiry with the staff administering the pretest and a review of the learner's file showed that at the point of the original pretest there was good reason to believe that this person was suffering from mental illness, alcoholism and a very recent negative experience with the criminal justice system. This person's behavior during and following the pre-test made the administering staff uneasy and suspicious about the validity and meaningfulness of the results. Nine months later, when this person returned, it appeared that help had been received and this learner's mental condition and intellectual acuity were

significantly changed. I decided to drop this person from the control group because of the dubious validity of the pre-test score. Leaving this learner in the control group would have raised the control group comprehension gain, but not to the point of statistical significance. The real point here is to further emphasize the fallibility of these statistical comparisons and the tremendous variability in the population TLC serves.

Despite these caveats, given the paucity of systematic evaluation data for literacy programs in general and technology-based literacy programs in particular, the findings on reading comprehension and math do make a contribution towards understanding and documenting the positive effects of the Technology for Literacy Center.

**Comparison of TLC with other programs**

Table VI provides some information on how the test results for TLC compare to other comparable literacy programs. These comparisons involve several methodological and statistical limitations. For example, some programs are using a different test which makes comparisons problematic. Some programs are not administering the TABE with time limits while TLC does. The criteria for admission into various programs can be different in ways that make the student populations non-comparable. Sample size in these comparisons also vary substantially. There is also some information missing for some of the programs. My summative evaluation colleague, Dr. Darrell Lewis, has examined the studies of other programs quite carefully as part of this cost-effectiveness analysis. He found serious inadequacies in those studies which make us very cautious about using them for comparisons of any kind.

## TABLE VI
## COMPARISONS OF TLC WITH OTHER LITERACY PROGRAMS

I. Basic Reading (grades 0-4)

| Program name: | TLC | BES | JCARP | FIST |
|---|---|---|---|---|
| Type of Program: | Tutor/CAI | Classroom | Classroom | Tutor |
| Test Used: | TABE | TABE | TABE<br>Johnson | WOODCOCK |
| Is the test timed? | Yes | Yes | No | No |
| Instructional Hours | Actual | Estimate | Actual (?) | Actual |
| Number of cases | 15 | 90 | 173 | 26; 26 (2 studies) |
| Hours per grade level change | | | | |
| Vocabulary | 78.7 | | | |
| Comprehension | 48.2 | | | |
| Composite | 63.2 | 100 | 53.6 | 48; 59.4 |

II. Other Reading (grades 5-12)

| Program: | TLC | ABLE |
|---|---|---|
| Test Used | TABE | ABLE (a standardized test) |
| Timed | Yes | No (untimed test) |
| Hours | Actual | Actual |
| Number of cases | 23 | 117 |
| Hours per grade level change | | |
| Vocabulary | 56.6 | No information |
| Comprehension | 39.6 | 32.5 |
| Composite | 52.5 | No information |

III. Math

| Program: | TLC | ABLE |
|---|---|---|
| Test Used | TABE | ABLE |
| Timed | Yes | No (untimed test) |
| Hours | Actual | Actual |
| Number of Cases | 19 | 226 |
| Hours per grade level change | | |
| Computation | 40.6 | |
| Concepts & Probems | 48.2 | |
| Composite | 45.4 | 13.7 |

Note: Table compiled by Dr. S. Stockdill from published reports and direct contact with other programs. Interpret with extreme caution given variations and differences in learner populations, testing approaches and tests used.

With these limitations in mind, the comparisons do provide another piece of the evaluation mosaic. It is in that spirit that this analysis proceeds. Given the methodological difficulties, I have not applied any statistical significance tests to these comparisons. Rather, these comparisons provide "ballpark" figures on number of hours per grade-level change for various programs. The issue here is whether TLC is in the "ballpark" with other programs.

For basic reading learners the TLC program shows 63.2 instructional hours per grade-level gain compared to 53.6 for JCARP, 48 to 59 for FIST, and 100 for BES. Only one of these other programs systematically records actual student time on task as TLC does. Given the statistical difficulties with these comparisons, I would conclude that TLC is in the "ballpark" with other programs.

I draw the same conclusion from the TLC comparison with ABLE in Part II of Table VI. TLC shows 39.6 hours per grade-level change for reading compared to 32.5 hours for ABLE, but ABLE uses a different standardized test and administers it without time limits. ABLE does track actual hours, as does TLC.

TLC is not in the "ballpark" with ABLE on math. ABLE, using a different standardized test, untimed, shows 13.7 hours per grade-level change compared to TLC's 45.4 hours per grade-level change on the timed TABE.

My summative evaluation colleague, Dr. Darrell Lewis, reviewed some of the research literature on grade-level changes per instructional hour which also contributes to the comparative evaluation mosaic. Sticht (1982), in summarizing dozens of military studies, indicates a grade-level

gain in reading takes enlisted men from 80 to 120 hours of instruction. Durkenwald (1986) reports that a study of the Manpower Development Training Act programs indicates that it takes approximately 135 hours to gain one grade level in reading for adults. Mikulecky summarizes this research and indicates that "100 hours of instruction per grade-level gain in reading is typical" (p. 25).

In summary, TLC appears to be in the "ballpark" with other reading programs of national interest and does substantially better than norms reported in the published literature. The single math comparison shows that TLC does not match ABLE'S extraordinary gain score statistics, but testing approaches and conditions are quite different.

**The attrition problem**

The population served by TLC is difficult to keep in an educational program. TLC is a voluntary program requiring self-motivation and personal initiative. It takes time, effort and a certain amount of discipline.

In attempting to understand the attrition problem, it is important to distinguish between (1) those learners who go through intake but never really get involved in the program from (2) those learners who begin active participation but then drop out. Program staff have designated 12 hours of instruction as the dividing line between serious participation and non-participation (based on State Department of Education definitions). In other words, those people who go through intake and enroll in TLC but never complete at least 12 hours in the instructional program have never really participated in the program. The number of such people divided by the total number enrolled through intake constitutes the non-

TABLE VII
PARTICIPATION AND ATTRITION DATA

| | Year One (5/29/85-5/31/86) | Re-entries In Year Two | Year Two (includes re-entries and summative) | Summative (9/1/86 - 4/30/87) | Total All Learners Two Years |
|---|---|---|---|---|---|
| **TOTAL LEARNERS** | | | | | |
| 1. Total in category | 798 | 283 | 909 | 165 | 1424 |
| **PARTICIPATION RATES** | | | | | |
| 2. Percent still active at end of period | 27% | 25% | 30% | 30% | 19% |
| 3. Percent completions who left the program | 4% | 16% | 8% | 2% | 7% |
| 4. Program participation rate (2+3=6) | 31% | 41% | 38% | 32% | 26% |
| **ATTRITION RATES** | | | | | |
| 5. Pending (not seen for 30 days) | 25% | 15% | 21% | 18% | 25% |
| a. less than 12 hours at TLC | (15%) | (1%) | (9%) | 8% | (13%) |
| b. more than 12 hours at TLC (Pending = a+b) | (10%) | (14%) | (12%) | (10%) | (12%) |
| 6. Inactive (No response to call or letter after 30 days) | 44% | 44% | 41% | 50% | 49% |
| a. less than 12 hours | (30%) | (17%) | (26%) | (38%) | (32%) |
| b. more than 12 hours (Inactive = a+b) | (14%) | (27%) | (15%) | (12%) | (17%) |
| 7. Non-participation rate (less than 12 hours at TLC, 5a + 6a) | 45% | 18% | 35% | 46% | 45% |
| 8. Drop-out rate (participated at least 12 hours, then dropped out, 5b +6b) | 24% | 41% | 27% | 22% | 29% |
| 9. Overall Attrition Rate (7+8) | 69% | 59% | 62% | 68% | 74% |
| 10. Total (4+9) | 100% | 100% | 100% | 100% | 100% |

participation rate. Table VII shows a non-participation rate in year one of 45%, in year two of 35%, and 46% for the summative group (line 7 in Table VII).

Drop-outs are here defined as those learners who spend at least 12 instructional hours at TLC and then fail to return for at least 30 days, and after being telephoned and being sent a reminder letter. The TLC drop-out rate was 24% in the first year, 27% in the second year, 22% for the summative group and 29% for the total two year learner population The total two year drop-out rate is higher than either single year alone because it includes year one carry-overs who drop-out in year two.

The situation is further complicated by re-entry learners. These are drop-outs and non-participants from year one who return in year two and active carry-overs from year one to year two. Of those who re-entered in year two, 18% failed to participate and 41% dropped out for an overall attrition rate of 59% among the re-entry group. However, one-fourth stayed active in year two after re-entry, and an additional 16% completed their TLC experience for an overall participation rate of 41%.

For the entire two years, the rates are as follows:

Total learners 1,424

| | |
|---|---|
| 1. Percent still active (as of May 30, 1987) | 19% |
| 2. Percent completions who have left the program | 7% |
| 3. Total participation rate (1+2) | 26% |
| 4. Non-participation rate (fewer than 12 hours) | 45% |
| 5. Drop-out rate | 29% |
| 6. Total attrition rate (4+5) | 74% |

To understand the two year attrition rate, it is important to understand that there are year one participants who drop out in year two. This increases the overall attrition rate for the two years. Thus, the total attrition rate for the two years is higher (74%) than the rates for either year one alone (69%) or year two alone (68%).

Table VIII shows the most common reasons given for non-participation or dropping out based on follow-up telephone interviews conducted by TLC program staff on a routine basis. These results show that the major reasons for both non-participation and dropping out are, in order of importance: moving; family problems; going to another program; irregular attendance; conflicts with work; health problems; changed job situations; transportation problems; child care problems; and being too busy.

For many, perhaps most, TLC adults, learning to read is not a straight path of regular hours, steady progress, routine patterns and ever forward movement. It is rather an irregular path crossing valleys, climbing mountains, and often cutting back to an earlier place or going in a circle. These learners encounter frequent obstacles - many minor, some major - which hinder or even stop their progress (sometimes for awhile and sometimes permanently). These obstacles include getting and losing jobs; family crises; sicknesses; depression; financial disasters (many live daily on the edge of financial crisis); changing residences (often involuntarily); and psychological barriers - loss of support, loss of motivation, or simply loss of faith. Many will drop-out in the face of these obstacles, some for months. But evidence is that 12% of first year drop-outs and non-participants have returned, some after prolonged

TABLE VIII
REASONS FOR NON-PARTICIPATION
AND DROPPING OUT

| | NON-PARTICIPATION (less than 12 hours) | | | | DROP-OUT (after at least 12 hours) | | | |
|---|---|---|---|---|---|---|---|---|
| | Year One | Year Two | Re-entry | Summative Group | Year One | Year Two | Re-entry | Summative Group |
| Number telephone interviews completed | 137 | 66 | 37 | 47 | 68 | 31 | 55 | 14 |
| **REASONS FOR LEAVING** | (Percentages based on number of interviews conducted) | | | | | | | |
| Moved (letter returned) | 20% | 27% | 30% | 26% | 21% | 23% | 15% | 14% |
| Phone disconnected | 13% | 6% | 5% | 13% | 7% | 3% | 2% | 21% |
| Family problems | 9% | 0% | 5% | 2% | 6% | 3% | 0 | 0 |
| Went to another program | 8% | 6% | 3% | 6% | 13% | 0 | 6% | 7% |
| Highly irregular attendance | 9% | 14% | 22% | 4% | 0 | 7% | 24% | 7% |
| Conflict with work | 7% | 6% | 3% | 9% | 13% | 16% | 9% | 7% |
| Health problems | 7% | 5% | 3% | 2% | 7% | 3% | 4% | 7% |
| Referred elsewhere | 2% | 2% | 0 | 2% | 6% | 3% | 2% | 0 |
| Accepted better job | 2% | 2% | 0 | 2% | 3% | 0 | 0 | 0 |
| Transportation problems | 2% | 4% | 0 | 2% | 2% | 3% | 6% | 7% |
| Found a job | 2% | 2% | 0 | 9% | 2% | 10% | 2% | 0 |
| Child care problems | 2% | 0 | 11% | 2% | 2% | 0 | 2% | 0 |
| Too busy | 2% | 3% | 3% | 0 | 2% | 3% | 4% | 7% |
| Instruction not helpful | 2% | 2% | 3% | 9% | 0 | 3% | 6% | 7% |
| Personal problems | 0% | 2% | 11% | 4% | 0 | 0 | 0 | 14% |
| TLC not appropriate | 1% | 2% | 3% | 6% | 3% | 10% | 4% | 0 |
| Completed some goals | 0% | 6% | 0% | 2% | 0 | 3% | 18% | 0 |
| Special Problems | 12% | 14% | 0% | 0% | 15% | 10% | 0 | 0 |
| | 100% | *103% | *102% | 100% | *102% | 100% | *104% | *98% |

* Rounding error so does not equal 100%

absences. Their initial experiences seem to have been sufficient to keep alive the possibility and hope of learning to read. Still, 41% of re-entry students (including year one carry-overs) dropped out, some for a second time, and 18% failed to put in 12 hours after re-entry. Whether second time drop-outs return a third time remains to be seen. But 41% of re-entry students remained active with 26 of them completing a GED and an additional 19 completed at least one full course after re-entry.

Given the reasons learners have listed for non-participation and dropping out, it may be difficult to reduce either non-participation rates or drop-out rates so long as TLC remains open for intake to anyone who meets minimum eligibility requirements. Moreover, with current participation rates, TLC is operating near capacity during hours of heavy use. The next section includes further discussion of "the attrition problem" in the larger context of learner progress and completion, and comparisons to other programs.

**Learner progress and completions**

One of the difficulties in adult literacy programs is defining completion. While the GED is the most obvious way to define completion, many other learners meet their goal of achieving functional literacy as personally defined without attaining a GED. Since there is no uniform, consensus definition of functional literacy, it is difficult to establish accepted completion criteria in addition to the GED. TLC has struggled with this issue and has found that the introduction of modules and courses has provided some additional indicators of progress and success for learners.

Table IX presents some perspectives on various types of progress at TLC. TLC, over two years, has provided nearly 32,000 hours of basic skills instruction to 1,424 learners, an average of 22-1/2 hours per learner. Since introducing modules and courses in March, 1986 (nine months into the first year), learners have mastered 844 modules and 241 courses. In year one, 15 learners attained GEDs and an additional 14 learners said that they had met their personal goals when they left the program. Three learners advanced to other programs, and two went to the Navy. In year two, 13 new students attained a GED, including two in the summative group. In addition, 26 re-entry learners attained GEDs in year two.

Completions include earning the GED, completing all personal goals, mastering at least one course before leaving the program, and advancing to another program for further study. Taken together these categories yield 105 learner completions for the two years, 7% of total learners. But this provides only the narrowest perspective on completion.

TLC has defined a completion to include four things: (1) completing a course; (2) completing personal goals and leaving the program; (3) attaining the GED; and (4) advancing to another program. However, the course idea did not become operational for evaluation purposes until the second year. There were no course completions in year one. This means that the most meaningful completion rate will include only year two learners. It will also include learners who are still active, or whose active status is in doubt, but who have completed at least one course. Using these criteria, the year two completion rate is 17% based on 909 learners (all new intakes in year two, all re-entries and including the

TABLE IX
COMPLETION DATA

| | YEAR ONE (5/1/85-5/31/86) | RE-ENTRY | SUMMATIVE EVALUATION PERIOD (9/1/86 - 4/30/87) | YEAR TWO: NEW INTAKES WITHOUT SUMMATIVE | YEAR TWO TOTALS (6/1/86-5/31/87) | TOTAL PROGRA (YEARS 1 AN 2) INCLUDIN SUMMATIVE GROUP |
|---|---|---|---|---|---|---|
| Total number hours | 15,979 | 4,194 | 3,069 | 8,756 | 16,019 | 31,998 |
| Total number modules mastered | 252 (3/86 - 5/86) | | 119 | | 592 | 844 |
| Total number courses mastered | 64 (3/86 - 5/86) | | 36 | | 177 | 241 |

**********

| | | | | | | |
|---|---|---|---|---|---|---|
| GEDs | 15 | 26 | 2 | 11 | 39 | 54 |
| Completed all personnel goals | 14 | 0 | 2 | 2 | 4 | 18 |
| Completed at least one course and left program | 0 | 19 | | 8 | 27 | 27 |
| Advanced to another program | 4 | 0 | 0 | 2 | 2 | 6 |
| TOTALS | 33 | 45 | 4 | 23 | 72 | 105 |

summative group). Please note that this completion rate is different from the rate for year two in Table VII because that table does not include in the completion rate calculation learners in the active or pending category who have completed a course. The completion rate in Table VII is based on learners who have left the program under one of the four completion criteria outlined earlier. The revised year two completion rate (17%) includes course completions for learners still in the program (both active and pending). All rates are based on unduplicated counts.

The real implication of these data is that computing drop-out and completion rates poses major definitional problems. The 17% completion rate is still an imperfect number. It is at best a rough indication of progress. The problem is the lack of good, generally accepted definitions for literacy educational progress, achievement and completion (short of the GED). This is not simply a TLC problem. I shall discuss this problem at greater length in the interpretations section of this report.

**Retention and attrition comparisons**

Table X, prepared by the TLC formative evaluator, Dr. Stockdill, shows retention and attrition data for select time periods. The earlier data presented in this report on attrition and completion was for one- and two-year periods. Other programs for which data are available do not report cumulative retention and attrition data for periods of a year or more. Rather, they report non-cumulative quarterly statistics. Table X reports TLC results for comparable time periods.

These data show that TLC retention rates have ranged from a low of 44% for the latter half of 1985 to a high of 65% for the second

TABLE X

RETENTION AND ATTRITION COMPARISONS
for Select Time Periods and Programs

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IS TLC RETAINING ADULTS WHO HAVE MADE AN INITIAL COMMITMENT TO PURSUE AN EDUCATIONAL GOAL AT TLC?

| DATES | May 29, 1985- Nov. 30, 1985 | Dec. 1, 1985- Feb. 28, 1986 | March 1, 1986- May 30, 1986 | June 1, 1986- Aug. 31, 1986 | Sept. 1, 1986 Nov. 30, 1986 |
|---|---|---|---|---|---|
| ENROLLMENT* | 542 | 348 | 328 | 385 | 423 |
| RETENTION | 44% | 53% | 65% | 53% | 63% |
| ATTRITION** | 54% | 44% | 32% | 44% | 37% |

*Based on the number newly enrolled during the time period, the active learners from the previous time period, and learners who returned to the program after they had been classified as inactive.

**Calculated on a quarterly basis so it would be comparable to ABLE, the Bronx Educational Services and Jefferson County Adult Reading Program. They define a drop-out as any learner who does not receive instruction for 30 days or who has indicated that he or she is leaving the program.

ATTRITION COMPARISONS

| TLC | | | ABLE | | | Bronx Educational Services | | | JCARP |
|---|---|---|---|---|---|---|---|---|---|
| Dates | Enroll-ment | Reten-tion | Dates | Enroll-ment | Reten-tion | Cohorts | Enroll-ment | Reten-tion | (N = 591) |
| 5/85-11/85 | 542 | 44% | Summer '83 | 295 | 49% | 1 | 27 | 52% | 78% |
| 12/85-2/86 | 348 | 53% | Fall '83 | 337 | 53% | 2 | 28 | 43% | |
| 3/86-5/86 | 328 | 65% | Winter '84 | 276 | 68% | 3 | 22 | 59% | |
| 6/86-8/86 | 385 | 53% | Spring '84 | 313 | 49% | 4 | 28 | 57% | |
| 9/86-11/86 | 423 | 63% | Summer '84 | 327 | 65% | 5 | 16 | 50% | |
| | | | Fall '84 | 407 | 62% | 6 | 24 | 46% | |
| | | | Winter '85 | 487 | 72% | 7 | 29 | 55% | |
| | | | Spring '85 | 469 | 68% | Total | 174 | 52% | |
| | | | Summer '85 | 477 | 71% | | | | |

* 1981-1984 data
* Based on semester
* Statistics from JCARP
* Learners must meet selection criteria

(Prepared by Dr. Stacey Stockdill)

quarter of 1986. The most recent period for which these data are available (the fourth quarter of 1986) shows a 63% retention rate.

These TLC results are again "in the ballpark" with other adult literacy programs of national prominence. The ABLE program shows a quarterly retention rate range from 49% at the beginning (Summer, 1983) to 71% for the latest available reported data (Summer, 1985). The Bronx Educational Services program shows a quarterly retention rate range between 46% to 59%.

These rates from different programs are not entirely comparable with TLC because of recruitment, eligibility, data collection and definitional differences. Nevertheless, they help answer the general question of whether TLC retention and attrition rates are "in the ballpark" with other programs. The comparisons in Table X show that TLC's quarterly retention rate has increased over time and that TLC is "in the ballpark" with select other adult literacy programs.

## ATTITUDES TOWARD TLC

### Learner perspectives on TLC

The primary focus of this summative evaluation has been on literacy outcome gains. We have examined those gains for the various groups of learners, compared those gains to a control group and to other programs, and examined the great variation among learners. This section turns to the question of how learners perceive and understand their TLC experience. Three methods have been used for this part of the evaluation mosaic.

First, I conducted three focus group interview sessions with learners: one group of new learners; one group of Basic Reading learners; and one group of other learners. A second approach involves analysis of questionnaires given to all active learners in February, 1986 and the spring of 1987. Third, two in-depth, qualitative case studies have been prepared to provide greater insight into and understanding of the literacy experience and impact for select learners. We shall begin with analysis of the focus group interviews.

**Focus group interviews with learners**

A focus group is a group interview. This technique has been adopted by evaluators from marketing research, where the approach has been found to be highly effective in soliciting valid and reliable information from consumers of products and services. By bringing people together in groups, they have the opportunity to hear each other's responses and to affirm that their own views have importance in the context of the group. We have found focus groups to be particularly valuable in situations where the interviewees might be somewhat intimidated by a university researcher if interviewed on a one-to-one basis. The group approach provides an environment of support among the interviewees for their shared situation which counters possible intimidation.

The interviews were conducted at TLC in a familiar setting for the learners. The interviews took place during the normal hours that the learners were at TLC. I conducted the interviews in October, 1986, during the summative evaluation period. Three focus group interviews were conducted, each of which took approximately two hours. While the

three groups were homogeneous (new learners together, Basic Reading learners together, and other learners together), the results were consistent across groups so I shall report only the overall findings.

There were six people in the new learner group; five people in the Laubach group; and eight in the group of other learners. The questions were--

1. How did you find out about TLC?
2. What did you expect at TLC? What were you told?
3. What difference will TLC and learning to read make to you?
4. What problems have you experienced?
5. What do you like about TLC? What do you dislike?

The purpose of these interviews was to provide an additional perspective on both TLC implementation and outcomes from the learner's perspective. The findings in this regard were quite clear and consistent.

**How do learners find out about TLC?**

The focus group interviewees learned about TLC from a variety of sources: friends and families; referrals from other programs; by visiting the mall for shopping; and from publicity. The most common and important way of learning about TLC was word-of-mouth and a personal recommendation from someone.

These findings affirm systematic intake data collected from all learners about how they learned of TLC. Those results show that nearly one-third report learning about TLC from a friend or relative; about one-third learned about TLC from another program; about one-fourth respond to publicity and media announcements; and others are walk-ins visiting the mall (about 10%). Roughly two-thirds of the learners, therefore, have responded to a personal word-of-mouth referral from a friend, relative or

professional in some other program (welfare programs, job programs, community programs and educational programs).

**First impressions**

The focus group interviewees reported very positive first impressions of TLC. The positive first impressions were very important to their subsequent participation because many of them described themselves as bashful, easily intimidated, having high test anxiety, and initially scared. Examples of how they described their first impressions of TLC are as follows (each quote is a different person):

> You're in the program the minute you walk into the door. No qualifications. You're in.
>
> My first impression? They mean business.
>
> They greet you with open arms. I have a problem, really. I was bashful. The instructor really helped me. It was a test, but I got a feeling that you could make this place a home. They make you feel like they want you. They make you feel that they will help you if you help yourself.
>
> The procedures take no time at all.
>
> The test was one-on-one. There was no test pressure. That helped me a lot. Under pressure I just mark anything. There was no pressure here.
>
> I was hesitant, but the computers attracted me.

**Reactions to the TLC computers**

Only about half of the interviewees reported actually understanding at first that the program involved computers. Others were initially informed about and attracted to the computers. Some found the computers initially scary, particularly in the Basic Reading group. But on the whole, they reported being able to adjust quickly to the computers and very much liked the chance to work with computers and the atmosphere created by the computer laboratory.

Other reactions to the computers included the following comments:

> I'm in love with these machines.
>
> Computers are where it's at. I really like the computers.
>
> I tell people I'm going to my computer class. I would be embarrassed to say I was going to learn to read, but it's great to tell friends I'm going to my computer class.
>
> There's no judgments with computers. It's better than a hairdresser.
>
> You go at your own pace. I liked the individuality. You take your own time. Nobody pushing you. You're learning computer and reading at the same time.
>
> It makes you feel like somebody important. You feel like you're part of the 20th century.
>
> I can at least keep up with my 10-year-old who is learning about computers at school. I can talk about computers with the kids.
>
> I like setting my own pace with the computers. You can even take breaks on your own when you want to.
>
> The instant feedback is great. You don't have to wait for teachers to check.
>
> Time flies here. In classes you get bored and you don't get the attention. The computer always gives you attention.

The Basic Reading group, in contrast, had very little experience with the computers. The Laubach learners reported that their volunteer tutors were not comfortable with or knowledgeable about the computers. They knew the computers were available but were not making very much use of them. They did, however, look forward to "graduating" "from Basic Reading to the computer program. The Basic Reading program uses tutors as the primary means of instruction with the computers available for supplemental work. It appears from these interviews that when the volunteer tutor is not comfortable with and knowledgeable about the

computer, the Basic Reading learner is less likely to take advantage of the supplemental computer opportunity.

For the other reading learners, however, the computer instruction appears to be working very well and to be generating a very positive response among learners.

**Reactions to the mall location**

The focus group interviewees all like the mall location. They said the mall is convenient; there is easy parking; it is a relaxing atmosphere; and its a comfortable place. Several of the interviewees drive long distances or take buses to get to the mall, while for others the nearby location was a positive feature. Most felt that the mall location was preferable to a school building. They described very negative past experiences with classrooms in particular and schools in general. The question about the mall location led to a number of negative comments about previously negative experiences with structured classroom learning.

One very important theme that emerged here was the importance of the ADULT environment of TLC. As one learner put it:

> This is really an adult place. We come here to do something, to get something. It's not a place for kids. There are too many kids in a regular GED program. Those programs aren't serious enough. They're not adult.

Another learner in a different group said:

> There's no hassle from kids like there is in a school. Here, it's just like you're going shopping and you go at your own convenience. It's open all the time.

Still another person talked about very negative experiences in school:

> The kids in a school are a distraction. You feel stupid being around kids when you're older. This is strictly business when you come here. You come to learn. School is different. In

> school people give you a hard time. They control you. Here you control yourself. You come to learn. I like being in a place with adults.

What learners like about TLC

All of the learners in the interviews had very positive comments about TLC. They reported liking the staff and being treated with respect by the staff. They reported liking the serious environment and the computer laboratory setting. They reported liking the curriculum, especially the individualized nature of the program and the opportunity to work at their own pace. Several patterns emerged in their comments. Things emphasized by the learners regarding the positive aspects of TLC were:

*Flexibility of timing - you come when you want to come

*You go at your own pace

*Instant feedback

*Placement at an appropriate level

*Friendly, helpful staff

*Friendly, helpful volunteer tutors (for the Basic Reading group)

*The adult environment of TLC

The focus group interviewees were quite articulate about individualized, self-paced computer learning. They expressed a clear understanding of the nature of the technology for literacy which TLC represents, and they affirmed that that technology was working to the benefit of their literacy. The technology, from their point of view, is undergirded by friendly, respectful and accessible staff in a clean, adult environment where learning is taken seriously.

These perceptions are also affirmed by the questionnaires administered to TLC learners. The open-ended questionnaire results and open-ended learner comments in the TLC log are filled with references to the friendly, helpful and respectful staff; the atmosphere, environment and appearance of TLC as conducive to learning; and the flexibility and self-pacing at TLC. The Basic Reading learners very much appreciate their tutors and the one-to-one relationship with the tutor.

The questionnaire results also affirm, as did the focus groups, that learners are highly aware of learning two skills at once at TLC: basic academic skills and computer skills. The results indicate that they like this dual emphasis, that they are aware of the importance of both kinds of skills in the information age, and that they appreciate the advantages of computer technology for learning.

**Dislikes**

On the whole, learners had much less to say about what they disliked than what they liked. Having conducted a large number of focus group interviews on various programs for evaluation purposes, I can assure the reader that this is not always the case. The question about dislikes tended to generate comments about what the learners disliked about other programs in contrast to what they like about TLC. There were, however, some suggestions from the interviewees. These suggestions parallel data from the questionnaires that has been used for the formative evaluation to improve TLC. Some learners said that they are sometimes distracted by conversations between teachers and learners, or among teachers. One person didn't like the computer screen because it was difficult to look at over time. Another commented that the

computer program was not supplemented by a book with the same content, and this learner wished she had a book congruent with the computer program for study at home. There was some concern that TLC was beginning to reach capacity and that it was becoming more difficult to schedule times. Another was concerned about needing help in talking and assistance with pronunciation. This generated a recommendation from several learners that there should be a conversation and pronunciation component to TLC.

The interview question about dislikes most often led to recommendations for ways of expanding TLC services. The more advanced learner group wanted the GED test to be offered at TLC instead of in a strange place. There were a number of suggestions for increasing recruitment through more advertising. There were suggestions for additional TLC sites. One learner for whom English is a second language objected to the TLC requirement for basic competency in English verbally before being eligible for the reading program.

On the whole, however, in both the focus group interviews and the questionnaires, recommendations tended to focus on ways of expanding TLC services with only a few complaints about relatively minor aspects of the program (the chairs, the computer screen, or occasional noise).

In brief, it is clear that active learners are very positive about TLC as a learning experience and environment.

**The personal impact of learning to read**

First, before discussing the impact of learning to read on learners' lives, it is important to affirm that the results indicate participants do feel that they are learning. Throughout the focus group interviews

there were comments about how much learners felt they were learning. They noted that the modules and sequencing made it clear to them that they were making progress. They reported being able to use what they were learning in their everyday lives. In the questionnaire responses, 77% of the learners indicated that they are "very happy" with their studies at TLC and 74% believe that they are learning "a great deal". The questionnaires yielded only two responses that learners were unhappy or not learning.

Given the perception among learners that they are learning, the question for the focus group participants was, what difference has what you are learning made in your lives?

I should note that I expected this to be a somewhat difficult and sensitive question. I expected that learners might have some trouble putting into words and articulating the impact of the experience of learning to read. I expected they might be shy, unaware of changes which occur gradually over time, and unlikely to focus on the cognitive and affective outcomes of concern to educators and academics.

I was wrong.

I was very much impressed with the learners' forceful articulation and awareness of the impact of learning to read on their lives. This question yielded the greatest amount of information in the focus group interviews and responses to this question went on for the longest amount of time with the greatest enthusiasm from learners. <u>These learners made it clear that the TLC experience and learning to read is having an important impact on their lives</u>. An example:

> When I think about what difference it has made to me, I think about my kids. I can read to my kids! And they like it. This

> makes me feel better so it makes me want to come more. It motivates them and it motivates me. When I was a kid my dad never had time to read to me. Now I can read to my kids!

The importance of reading to kids and of the impact on families was a prominent theme in the comments of learners. One man from a minority group became quite emotional in describing the importance to him of reading to his kids. His openness, sincerity and commitment were quite moving to everyone in the group.

> I'm learning just enough to keep ahead of my kids. My family is my motivation. Me and my family. Once you can read to your kids, it makes all the difference in the world. It helps you to want to read and to read more. When I can read myself I can help them read so they can have a better life. The kids love it when I read to them.

Others expressed the importance of learning to read for themselves.

> I want to know that knowledge I was denied in high school. I want to know!

> I want to do this because I want to do this. I know I'm smart. If I had had this in high school, I'd have been a genius before I dropped out of school. I want to use my smarts.

> My children have all done well. They're all grown and gone now. But I never graduated. I quit school at 16, worked for years and got my kids through school. Now the kids are gone and I'm doing this for myself!

For other learners a primary motivation is aspiration for a better life. Several learners in the more advanced reading focus group have high expectations for further achievement. They plan to go on to community college, to trade school and/or to better jobs.

> I can get my GED, go to community college and get promoted. At work they know I'm coming. My supervisor is supportive. This is my ticket up.

Finally, there were a number of comments that are indicators of how learning to read enhances self-esteem. Some said it quite directly:

I do it because I feel better about myself. The impact? I'm much more confident.

Now I know I can do something I never was sure I could do and I can share what I can do with other people. I can tell them. I'm making more progress here than other schools I went to. So now at last I know I can do it.

I was always intimidated before. I don't feel I have anything to be ashamed of any more. I'm not afraid now. I may not get it all right, I may still get it wrong, but I'm going to keep trying because now I know eventually I can do it.

The effects on self-esteem were tied to some of the effects on families.

My little girl came home with a print-out from school. Now I come home with a print-out too. It's kind of bad when a kid knows more than you do as a parent. I feel good about keeping up with my kids. That's important to me.

My kids went to college and I didn't even have a GED. Now I feel good about taking care of my education.

Some kids get a GED but still don't know anything. Now I know I'll get mine, but I'll know something!

This sample of comments indicates how open and in touch with their feelings these learners are. They made it clear that learning to read is not a small, incidental facet of their lives. It holds for them the key to new possibilities and new feelings about themselves.

I want to do a civil service test. I never thought I could before. Now I know I'll be able to.

I used to be ashamed of not knowing, ashamed everywhere. Now I'm not ashamed. I'm learning. I've got a chance.

<u>Self-motivation</u>

I asked the participants in each focus group, "What does it take to make it at TLC? What does it take to be successful?".

Again, the answers were direct and articulate. The central theme was self-motivation and self-discipline.

Here, if you want to learn, its up to you.

We have choices in our lives. If you choose to learn, you can learn at TLC. But you have to choose to learn.

Maintaining motivation is clearly a central issue given the large non-participation rate and the high drop-out rate. This makes it important to understand why some learners are able to stick with it, while so many others fail to participate or drop out. As the focus group interviewees deliberated on this matter, they were fairly unsympathetic to those of their peers whom they perceived as lacking the motivation and discipline to take advantage of the TLC opportunity.

At the same time, they were fairly aware of what undergirds their own motivation. Primary seemed to be the fact that they were making progress.

I can see my progress, see I'm doing good, so I want to keep doing better and better.

Seems like when I learn something, I know I can do more.

The curriculum is in parts. I can see each part, so its not overwhelming. I can see that I'm moving through the parts.

I want to keep up with the times. I want to learn new things. I'm older. I've got to compete with younger kids, and this is helping me do it.

Even for those who aspire to read and learn, other events and personal difficulties can interfere. Two of the focus group participants had stopped coming to TLC. After 30 days of inactivity, they received the routine telephone call by a TLC staff person.

A couple of months ago I was laid up and they called me regularly. They were understanding. I felt good about being called. I question if they hadn't called, if I would have come back. That caring attitude helped me come back.

The other learner commented:

> I dropped out and couldn't get the nerve to call, and then they called me. I wouldn't have come back without that call. I'm so glad they called. It made just the right difference.

Still another factor mentioned by a couple of learners was their increased maturity. They noted that as teenagers they were undisciplined and did not take advantage of school. Now, they felt, as adults they finally realized the value of learning and appreciated the opportunity TLC provided for adult learning. They explained that some teenagers, no matter how good the schools are, simply aren't mature enough to take school seriously. TLC, as an adult learning opportunity, is important for such people.

> I'm more settled now. I'm mature. I can do this where there was no way when I was younger.

> When I was a kid school was nothing but pressure. I like not being pressured here. The only pressure is from myself. You pick your own time and do what you need to do. I can do what I need to do now that I'm older.

Finally, there were several learners who had experienced other programs and found TLC uniquely attuned to their needs. One example is a learner who described herself based on her previous program experiences as a "slow learner."

> I was always scared of being a slow learner. I was around people, like at church, and I felt so bad. It hurt not to read. I feel lots better here. I have to feel I'm learning, feel I can do it. I feel I can do it here. I am doing it here. I come to learn. Before I was getting nothing. I came back here because I learn more here. This works for me.

Another set of comments illustrate the ways in which reading can have an impact on one's daily life. These reflections indicate the things a reader can do that a non-reader cannot do, and day-to-day feelings about self.

I pick up the newspaper now, and actually read it.

Yeah, I love to pick up the newspaper now. I used to hate it. Now I love the newspaper.

I can follow sewing directions. I make a grocery list now, so I'm a better shopper. I don't forget things.

Yeah, you don't know how embarrassing it is to go shopping and not be able to read the wife's grocery list. It's helped me out so much in the grocery store.

Helps me on the medicine. Now I can read the bottles and the directions! I was afraid to give the kids medicine because I wasn't sure.

I don't get lost anymore. I can find my way around. I can make out directions, read the map. I work construction and we change locations a lot. Now I can find my way around. I don't get lost anymore!

Just getting a drivers license will be wonderful. I'm fifty. If I don't get the GED..., but if I can get a license...! I can drive well but I'm scared to death of the written test. Just getting a driver's license...driver's license...

Now I read outdoor magazines. I used to just read the titles of books - now I read the books!

I was always afraid to read at school and at church. I'm not afraid to read the Bible now at Bible class. It's really important to me to be able to read the Bible.

I can fill out applications now. You have to know how to fill out an application in this world. I can look in the Yellow Pages. It used to be so embarrassing not to be able to fill out applications, not to be able to find things in the Yellow Pages. I feel so much better now. At least my application is filled out right, even if I don't get the job, at least my application is filled out right.

It is clear from these excerpts that TLC learners are very much aware of the progress they are making in reading and the difference that progress is making to their lives, both in being able to better carry out day-to-day tasks and in feeling better about themselves overall. They are keenly aware of how well they are doing.

> When I started, I didn't think it would work. But the other night I realized how far I'd come. It felt good, real good. The instructor said, 'You don't need a tutor anymore. You can read well enough now to get along on your own without a tutor.' It felt good, very, very, good.

These focus group interview results provide some qualitative insights into the TLC experience and its impact on learners. Much deeper insights are provided by more detailed case studies of individual learners. Two such case studies are included in this report, one of a Basic Reading program participant and the other of a learner who achieved the GED. These cases were purposefully selected to illustrate variations in the kinds of learners who come to TLC and to provide a deeper understanding of what learning to read can mean to an adult.

**The perspective of basic reading volunteers**

This section presents information from the perspective of volunteers. One focus group was conducted with seven volunteers. This section also draws on two surveys of volunteers, a questionnaire administered in February, 1986, to all 37 volunteers with a 50% response rate, and a questionnaire in the spring of 1987 administered to all 47 volunteers with a 53% response rate.

Volunteers receive standard, regularly scheduled training from the Minnesota Literacy Council. Following additional TLC orientation, they then can tutor at TLC. The volunteers had found out about the opportunity to volunteer from a variety of sources: television advertising; St. Paul Community Education newsletters; personal contacts; company tutoring programs; and media requests, especially the newspaper. The focus group volunteers had two to eight months of experience. Their comments in the focus group interview showed a high level of

commitment to helping others and a high value placed on being able to read. They tutor one-on-one in the Basic Reading program which they described as "very scripted, very structured, and very dependent on the tutor." All volunteers have completed the 12-hour Laubach workshop.

The volunteers reported seeing real increases in their learner's ability to read.

> TLC is working. They are learning to read quickly and have more confidence as a result.
>
> My learner is making remarkable gains. But he is really highly motivated.
>
> My student tells me he knows he's reading more things. He's excited about that. It's working for him.

The volunteers in the focus group interview commented on the very difficult life circumstances in which many of the students find themselves. They have heard from their students about family problems, conflicts with their children or work, and difficult personal problems.

They feel appreciated by students and personally rewarded for their efforts. Several commented on TLC as being very well organized which makes it easy for tutors to get and stay involved.

Questionnaire results also affirm that TLC "is well organized with a simple recordkeeping system." On the questionnaire, volunteers were given an opportunity to comment on what they like about working at TLC. Examples include:

> I certainly enjoy the feeling I receive from helping someone make their lives easier and fuller. I appreciate the support that the TLC staff gives to learners and tutors.
>
> It's a professional setting--everyone is friendly, helpful.

> Great environment--extremely accommodating for volunteers--for that I'm truly grateful!
>
> I absolutely love tutoring....

Throughout the interviews and questionnaires, volunteer comments were positive affirmations of TLC's program, facility and staff.

However, in both the focus group interview and on the formative evaluation questionnaires, volunteer tutors expressed concerns. Several felt that the specific orientation and training for TLC is insufficient. They want more than just the standardized Laubach training. In particular, some of them feel that they need training on the computers if they are to help learners make the transition to computers; they need training or advice on how to interact with learners about their personal problems; and they want more training in how to support, encourage and motivate learners. These issues have been and are being discussed at TLC as part of the formative evaluation and various program efforts to increase volunteer effectiveness.

TLC has a volunteer newsletter and has sponsored volunteer meetings with mixed success. The formative evaluation has provided valuable information for improving the volunteer program, and changes have been made in the volunteer program during the two years of TLC operation. Volunteer tutors are critical for the success of the Basic Reading program. Helping the learners make the transition to computers appears to also require helping the tutors to work with computers comfortably.

It is very clear from the interviews with both learners and volunteers that the staff position for volunteer coordination is important.

The organization and coordination tasks of matching learners and tutors, and monitoring each, is both mammoth and critical.

**The perspectives of staff**

The perspectives of staff come from individual interviews and formative evaluation questionnaires administered in February, 1986 and the spring of 1987. Staff positions are specialized and well-defined. There are both part-time and full-time staff. Staff know what they are supposed to do and feel that they have the support to do their jobs. They expressed a high degree of commitment to TLC and enthusiasm for what they are seeing at TLC.

From the perspective of organizational culture, it is clear that staff at TLC share common values. They share a belief in and commitment to adult education and creating a genuinely adult environment. The staff is very sensitive to learners as adults. The staff is also very much attuned to individual student needs. In every aspect of the program, from intake through testing, in recordkeeping and instruction, the staff emphasized the importance of meeting the needs--the varying and diverse needs--of individual learners.

Another element of the organizational culture is a sense of teamwork. The specialized roles and discrete jobs of the different staff let each person feel that they are contributing to the overall team effort. On the questionnaires and in the interviews, staff expressed a strong sense of "team" cooperation. They expressed respect for their colleagues and commented on the fact that staff members help not only learners but each other.

Another primary element in the organizational culture is a strong

sense of innovation, flexibility and change. Staff members are keenly aware that they are part of an experiment. They believe that experiment is important and they are committed to making it work. Each person in the individual interviews shared ideas about how the program had already changed and ways in which the program was likely to change in the future. They feel free to make suggestions to the director and each other about changes. They expressed a strong commitment to innovation and adaptation.

Yet another element of the organizational culture is a strong emphasis on recordkeeping. Staff in many organizations loathe recordkeeping. On the whole, TLC staff expressed a commitment to systematic and careful recordkeeping because they want to help learners document their learning, they have experienced firsthand the value of well-organized records for program coordination and management, and they appreciate the importance of good records for public accountability. With both part-time and full-time staff, and with many different staff working with the same learners, the comprehensiveness of the files and the care with which learners files are maintained are central to TLC effectiveness. Thus, far from resenting the great amount of paperwork and recordkeeping involved, staff expressed a commitment to and support for systematic recordkeeping.

Another organizational culture motif is a strong sense of personal involvement. In both individual interviews and questionnaire responses, the staff expressed a strong sense of personal involvement. Through staff meetings and on-going interactions, staff members have an

opportunity to make suggestions and to help create the TLC program. They feel involved.

This sense of involvement seems to have contributed to the strong sense of responsibility among staff. Again, in both individual interviews and questionnaires, it is clear that staff members feel responsible for the success of individual learners and the overall program. Staff involved in intake expressed a strong feeling of responsibility for making sure that learners understood TLC and for making them feel welcome. The testing staff worry about creating an anxiety-free testing environment and making the testing feedback meaningful to learners. The instructional staff feel responsibility for making the instructional program work. There's a strong sense of shared responsibility where each job is understood to be important in the overall picture.

Finally, the organizational culture reflects a strong sense of professionalism. Staff think of themselves as professional educators who have a strong sense of purpose, ethics and educational values. As professionals they have knowledge of the options available in adult education generally and literacy education specifically. They have chosen to be at TLC because their knowledge and professionalism lead them to believe that computer-assisted instruction can be effective and is the wave of the future.

These staff characteristics and these elements of organizational culture have been documented in organizational research as common motifs in highly innovative and highly effective programs. Thus, the interview and questionnaire data indicate that TLC has created an

effective staff environment for this kind of innovative, experimental and forward-looking program.

However, the research literature also has documented the down side of such organizational cultures. Innovative and experimenting organizations often lead to high levels of staff burn-out and can be difficult to sustain. There are indicators in the interviews and questionnaires that this may be an issue in the future. A number of staff commented on feeling stressed and time-pressured. In the formative evaluation questionnaire, staff were asked about the best and worst aspects of working at TLC. The best things involved those elements identified above as a positive part of TLC's innovative organizational culture. The worst part included "stress and multiple demands to meet." Comments included--

> Expectations are so high, sometimes there is a lot of stress and rush due to change, and positive feedback gets neglected.
>
> Stress. We need a commitment to focus, and our energies are being diverted into too many directions.
>
> I don't have time to become familiar with the new software and present materials.
>
> The pace of change is fast and there is so much to know for so many levels of learners. It takes years to gradually learn about all the materials.
>
> Need time to keep up with materials and procedures.
>
> Sometimes feel overwhelmed in new procedures, new software, new forms but this is usual (I believe) in most new programs.
>
> Having too many needs to meet at once---
>
> I spend far too much time here. I don't get a chance to relax, eat and/or go to the bathroom.

It is clear, then, that TLC has a dedicated and hard-working staff. TLC has created a positive organizational culture supportive of

innovation, change and serious adult education. The staff believe in what they are doing. They are also experienced with other programs and other approaches to literacy, and using that knowledge, they, themselves, evaluate TLC in comparison to other programs. When asked, on the staff questionnaire, how TLC compares with other programs, comments included the following:

> TLC is more challenging by way of curriculum planning.
>
> TLC is more exciting and professional than other organizations, and more stressful.
>
> TLC compares very favorably with others. It is innovative and flexible. There is an ongoing effort to improve and update instruction and materials.
>
> TLC is superior in a number of ways:
> 1. the staff acts in a professional manner where the student is the main concern; and
> 2. co-workers respect each other in professional decisions regarding student instruction.
>
> TLC is more hectic--never relaxed. I enjoy being busy but..., too many irons in the fire sometimes.
>
> TLC is better in terms of numbers of people served; atmosphere (professional, businesslike, positive); continuous efforts to improve the program.
>
> Definitely it's more fluid and dynamic than other programs. I feel confident that TLC is working towards building a sound model for computer instruction in the literacy area.
>
> TLC compares favorably, especially the frequent tests to chart progress. Learners constantly see whether and how quickly they are improving.
>
> I'm impressed with innovations here and the details of the system. Clear recordkeeping and reporting procedures.
>
> Very organized, I feel I have acquired many skills here, transferrable skills.

TLC appears to have been helped in its efforts to attract high quality staff by being part of the St. Paul Public Schools and paying

salaries at the professional level dictated within this major urban school district. The comments of learners and volunteers also emphasized the high quality of TLC staff as a major factor contributing to the program's success.

The interviews also produced one other observation that is worthy of emphasis. The director of TLC is held in very high esteem by the staff. She is perceived as being on the cutting edge of computer-assisted instruction in the United States. She is respected for her knowledge and her management. Many staff wanted to make it clear that they consider the director a key factor in the program's success from initial conceptualization through implementation and management.

## INCENTIVE GRANTS

The Technology for Literacy Project includes an incentive grant component which makes awards to area programs for introducing computer-assisted literacy instruction. The awards are made through a request for proposals process. In 1986, six awards were made ranging from $2,430 to $5,000. The incentive grant awards went to public adult literacy programs in the Twin Cities metropolitan area. The awards were used to purchase computer hardware, software and for in-service training. All awards required matching funds.

To evaluate this component, I conducted interviews with the six project directors and reviewed project documents and reports.

Each director was asked to confirm that the planned uses of the awards were taking place. They were all able to do so and have submitted reports to TLC describing their activities. The six different

programs are at various stages in implementation. They have found that selecting hardware and appropriate software has taken much more time and has proven more difficult than expected. Some of them also experienced delays in obtaining matching funds. However, at the time of this summative evaluation, all six incentive grant award recipient programs were moving forward with their plans for computer-assisted instruction.

Each director was asked to comment on the extent to which the grant from the Technology for Literacy Project was critical in his or her efforts to introduce computer-assisted instruction. "Was this something that you would have moved forward with anyway, regardless of whether you received an incentive grant award?"

In every case the directors reported that the incentive grant award was critical. One director said--

> The incentive grant made it possible to do it at all; made it possible to do it now; made it possible to get the district to buy in with the matching grant; and became the catalyst for our teaching staff and helped overcome staff resistance.

Another commented--

> We could not have done it without the incentive grant. Absolutely!

I then asked the directors how important computer-assisted instruction would be in their overall program. All of them indicated that they saw computer-assisted instruction becoming increasingly important in the years ahead. They noted that this early, initial effort was creating a great deal of interest and already leading to plans for expansion. Comments included--

> The role of technology will clearly grow over time. It was important for us to do more than just tutoring. We need the technology and we need to learn what it does.
>
> This direction adds a new dimension that we have not had. It is very important to the future of our students and our program.
>
> We have not made good use of computers and software. The idea was to light a fire under our staff. It has been extremely effective in lighting that fire. Everyone has been involved, both emotionally and instructionally. We've spent over half of our staff meetings discussing this grant. All are using it, though English as a Second Language is using it less. All teachers have become heavily involved. We are moving more in this direction. It has motivated the staff and enabled us to move in a new direction--and has already made a difference in our instruction and will make an even greater difference in the future.
>
> Our teachers now want computers. We really see this making a difference and we see our program making much greater use of computers. Now that we've got it, it's growing rapidly.

Finally, I asked these directors what role TLC had played in supporting their efforts. All directors had high praise for TLC. They commented on the willingness of TLC's director, Dr. Turner, to visit their programs, explain computer-assisted instruction, and create an environment of enthusiasm among staff. All of the staff in these programs had taken advantage of TLC's training, and had found that training enormously helpful. TLC has been helpful in making hardware and software decisions, and in helping sort through the complexity of the field.

Finally, the directors commented on the tremendous value they found in the evaluation and information systems they got from TLC. The internal formative evaluator, Dr. Stockdill, received high praise for her assistance in establishing the testing, evaluation and information systems in the new programs. One director said--

> I'm really positive about the whole thing, especially the way the evaluation system is working. The evaluation system is really important, very important. That's been great for us.

Site visits to TLC were made by some staff in each of the recipient programs. Those site visits were very helpful as were follow-up contacts with TLC staff to ask questions and get assistance.

> TLC has been wonderful in being responsive when we ask really dumb questions about computers and using them. They've been very understanding, thoughtful, and open. It's been incredibly positive.

It is clear from these interviews that the incentive grant award component has been highly effective in introducing computer-assisted instruction to other adult literacy programs in the Twin Cities area. A new request for proposals was issued in the spring of 1987 and more incentive grants will be made to new programs in 1987.

## TRAINING COMPONENT

As noted in the previous section on incentive grants, TLC has provided training to staff of programs receiving incentive grants, and that training has been very well received. That training is indicative of the kind and quality of training TLC has provided to professional adult literacy educators during the past two years.

The original proposal included a training component aimed at extending the influence of The Technology for Literacy Project. The training component was to include workshops, student internships, professional networking, and a variety of information dissemination efforts. The original proposal foresaw that the TLC director would devote 20% time to training and other instructional staff would devote approximately 10% time.

The internship training has been smaller than originally projected. The proposal projected ten interns in year one and 25 in year two for a total of 35 during the first two years. In actuality, there have been five interns and one student teacher at TLC; there have also been eight work-study students.

TLC records show that there have been 773 mail responses to requests for information. During the two years from May, 1985 through April, 1987, TLC has had 1,027 visitors including 61 from out-of-state and 16 from other countries.

TLC has conducted 47 workshops for a wide variety of adult literacy programs and staff. These workshops focus on how to use computer-assisted instruction for literacy training. The workshops are typically preceded by having potential participants complete a needs assessment form which reviews their previous training and ask them to assess their needs and interests in using computers for adult education.

TLC has hosted two national conferences. The first was the "Conference on Adult Literacy and Computers" held November 20-22, 1985, at Spring Hill, Minnesota. There were 50 participants from throughout the United States. The evaluation results show that the conference was particularly effective in establishing a forum for dialogue and issues discussion; exchanging information on current uses of technology; enhancing participants' personal networks; and generating excitement about and commitment to using computers for adult literacy. The conference was moderately effective in helping participants project the future of technology in adult literacy; beginning a national network; and increasing understanding of resources. The least effective aspect of the

conference, based on the evaluation results, was participants' development of actual action plans. The conference proceedings were published as a monograph which has been widely distributed as part of TLC's efforts at dissemination. The 63 page monograph is a resource book for computer-assisted adult literacy programs.

The second national conference was held April 24-25, 1987, for ten technology consultants nationally. The "technology consultants" effort combines training and dissemination as part of an Adult Literacy and Technology Project funded by the Gannett Foundation. The goal of the project is the infusion of technology into adult literacy programs with the belief that technology can make the difference in teaching "low-literate adults by empowering them with the tools of modern society" (quoted from a memorandum to technology consultants from Eunice N. Askov, Institute for the Study of Adult Literacy). TLC, under Dr. Turner, was awarded the sub-contract for training the technology consultants. The United States has been divided into ten regions and one technology consultant has been identified and trained for each region.

Both steering committee members and technology consultants participated in the training. Evaluation results showed that the conference was fairly successful in training consultants; however, several participants felt that there was too much information in too little time. By hosting the national conference for technology consultants, TLC has been clearly identified as a national leader in computer-assisted adult literacy education. The limited resources of TLC are being well used in providing training to adult literacy instructors in Minnesota. The

internship TLC goals were not met, but in retrospect, were probably unrealistic and unmanageable.

Finally, it is worth noting the effect of the training component on TLC staff. The staff interviews showed that TLC staff take pride in being involved in training, both locally and nationally. Staff take seriously their responsibility for training and dissemination as leaders in computer-assisted adult literacy education. This pride is balanced, however, by the additional demands such training make on staff time and resources. On balance, the training component appears to have contributed substantially to the TLC effort both in its contributions to others and in making TLC staff more reflective and effective.

## RESEARCH COMPONENT

The original proposal for the Technology for Literacy Project included a research component to study various issues and questions related to computer-assisted literacy instruction. A research committee consisting of seven people from different organizations was formed to advise on research. That committee met twice, shared some ideas but has subsequently engaged in no activity.

This summative evaluation report is clear evidence that TLC has taken evaluation seriously and has gathered a great deal of information about learners, their experiences and their progress. However, the proposed vision for an active research component and research committee as part of the Technology for Literacy Project has not been realized.

The research advisory committee did recommend that the research efforts for the first year focus on baseline data and evaluation needs, and

this was done. Anticipated research projects with the Northwest Regional Labs and the University of Minnesota did not materialize in 1986. However, TLC did assist CTB/McGraw Hill in developing a new version of the TABE test.

Of the four components of the Technology for Literacy Project, the research component is the weakest in comparison to the original proposal. The evaluation and management information systems are, however, exemplary.

## INTERPRETATIONS AND CONCLUSIONS

This final section will address (1) factors which have contributed to TLC's success and (2) issues which merit further examination as ways of improving TLC's effectiveness. This discussion is based on all the many different data sources which have informed this summative evaluation.

### Factors in TLC's effectiveness

There are ten factors which stand out as having contributed to the high level of TLC effectiveness as reported throughout this summative evaluation. It is fair to call these "success factors" because the results indicate that TLC has been successful and effective in meeting its mission.

#### The technology

The evidence is that computer-assisted instruction is effective for a significant number of adult learners. Computers are attractive to these learners and provide the kind of individualization and time flexibility which helps these adults learn at their own pace and in content areas of greatest need. Moreover, the centrality of computers to the information

age and the future of society make this technology particularly attractive to both learners and staff.

There is still a great deal of software development to be done, but the potential appears to be enormous. However, it is important to temper reliance on the technology with a recognition that computers have not been effective for all learners. Some of the non-participants and drop-outs at TLC reported not liking the computers. Moreover, for the basic reading group, tutorial instruction remains critical. Finally, effective use of the computers requires effective teaching and instructional support. In short, while the technology is effective for adult literacy education, its effectiveness is greatest when appropriately used by skilled teachers in a program set up to make use of both the technology and human beings as TLC has done.

**Leadership**

It is clear that the Technology for Literacy Project has benefited enormously from the leadership of Dr. Turner as director. Effective programs don't just happen. Dr. Turner was responsible for the original design and the proposal as well as its implementation. Part of her leadership involved the wisdom to change and adapt the original design when something wasn't working or when a possibility for greater effectiveness appeared.

The first two years of TLC have been characterized by a great deal of development, trying out new ideas, and making changes in virtually every aspect of the program. Dr. Turner has also provided leadership outside TLC for the greater metropolitan community as well as nationally. The stability provided by her leadership over the entire three years of

the Technology for Literacy Project (including approximately one year to develop the original idea before it became operational) has contributed significantly to project success.

**Dedicated and skilled staff**

Dr. Turner has assembled an effective and skilled staff who share her vision, commitment and enthusiasm for computer-assisted adult literacy education. The section of this report on staff perspectives discussed at some length the importance of the staff's contributions to TLC effectiveness. As noted in that discussion, there are emerging signs of stress among the staff related to the intensity and demanding nature of their contributions. It is important to emphasize the importance of staff because those interested in replicating TLC need to understand that it is not just a structural model, a curriculum and a teaching plan. As I observed above in discussing the technology, the effectiveness of the program and its use of technology depends on competent and committed staff. (I have emphasized this point in part because of a common public perception in connection with computer-assisted instruction that computers can and will replace human beings as teachers. TLC, in my judgment, is evidence to the contrary. Computers and effective staff are mutually reinforcing, each extending and increasing the effectiveness of the other.)

**Evaluation**

As a professional evaluator, I am particularly impressed by TLC's approach to evaluation. The Technology for Literacy Project has engaged in evaluation the way it is supposed to be done. The evaluation was planned and implemented from the beginning. Serious attention was

given, from the beginning, to collecting data on key aspects of the program, including testing data, participants reactions, staff reactions, and volunteer reactions. Careful attention was given to establishing a comprehensive and usable management information system.

A clear distinction was made between formative and summative evaluation. The program was given time to be nurtured and developed in the formative mode before the summative evaluation took place. A skilled and committed formative evaluator was hired to support the program's development efforts and to work internally with the director and staff in a supportive style. It is clear that the formative evaluator, Dr. Stockdill, has gained the trust and attention of the TLC staff. The formative evaluation results have been used to improve the program. Dr. Stockdill has also been used as a TLC resource in helping other programs establish their evaluation and data collection efforts. The summative evaluation, in contrast, has relied on external and independent assessment of both performance and cost. The summative evaluation has appropriately been directed to the Board.

There is a great deal more that can be said about the ways in which this evaluation has been effectively planned and implemented by TLC. In short, TLC is a textbook example of how to conduct evaluation in accordance with the standards for educational evaluation, namely, that the evaluation be useful, practical, ethical and accurate (Patton, 1986:24-6). TLC's approach to evaluation has been exemplary.

**Donor Review Board**

The Donor Review Board consists of people at the top of their respective sponsoring organizations. These key individuals have asked

hard questions and taken a personal interest in TLC. Staff are aware of that interest, as are others in the community, and it has made a difference in how TLC is perceived. The Donor Review Board has been supportive while holding high expectations and emphasizing both excellence and accountability.

**Performance orientation**

The Donor Review Board, the TLC director, the staff and evaluator have all been performance-oriented. From the beginning TLC was dedicated to making a measurable difference, not just counting the number of participants. Being results-oriented has been a fundamental undergirding value of TLC without, as sometimes happens, becoming distorted by ignoring how outcomes are achieved. There has been no creaming of participants; no teaching to the test; and no special efforts to make the evaluation results come out positive. The attention to results has been aimed at genuinely improving the program, not simply public relations. The literature on organizations clearly indicates that results-oriented organizations achieve excellence over the long term.

**Attachment to the St. Paul Public Schools**

The decision to attach TLC to the St. Paul Public Schools appears to have served the program well. The attachment to the school system has been the basis for paying professional level salaries to attract high quality staff. Often, innovative programs depend more on dedication than fair financial remuneration to sustain the innovative effort, and under such conditions stress and burnout appear early and intensely. The institutional attachment to the school system has also provided a sense of stability and institutional legitimacy as part of the school system's

community education effort. The superintendent of the St. Paul Public Schools is a member of the Donor Review Board. The long-term institutionalization and legitimation of TLC appears, at this point, to be well served by the attachment to the St. Paul Public Schools.

**Multidimensional project conceptualization**

The Technology for Literacy Project has included four components: The Technology for Literacy Center for direct services; incentive grants; training; and research. This multidimensional, broad-based conception of the adult literacy project appears to have contributed to the project's success. These multiple responsibilities have increased the staff's sense of responsibility to the larger community and have helped attract local and national attention to the program. Program effectiveness and innovativeness have attracted attention, which has increased the commitment to effectiveness and innovativeness, which has further attracted attention, etc....

Quite apart from what might have been distractions from the delivery of services, it appears that the training and evaluation efforts (evaluation has been the primary research endeavor) have undergirded and enhanced direct services. It is clear that such supporting activities must be kept under control so that the Center's limited resources are not strained inappropriately. In this case, these additional activities appear to have attracted additional resources, for example, the technology consultants national effort.

The multidimensional nature of the project, then, has clearly placed this effort in the larger context of societal change and national needs rather than focusing narrowly on local service delivery as an end in

itself. This larger conceptualization seems to have served the program well.

Special attributes of the Technology for Literacy Center

Technology was identified as the first success factor in this interpretations section of the report. Technology is clearly one of the special attributes of TLC, but other attributes are related to the technology. In addition, TLC has other special attributes which are not directly related to the technology. I want to comment on both kinds of attributes.

Related to the technology is the individualized nature of the instructional program. Individualization applies to both the instructional content and instructional delivery. Instructional content is based on diagnosis of the individual learner's capability, expression of the learner's interests and identification of the learner's needs. Thus, learners are working on things of interest and importance to them. Individualization in the delivery of the instructional program relates to flexibility in timing and participation. It is important to learners to be able to work at their own pace, to come when they want to come, and to stay for as long as they can or want to stay.

The adult environment at TLC is a special attribute for learners. Many of the learners commented that, as adults, they want and need an adult environment in which to learn. They also, on the whole, like the mall location. It is convenient; it is accessible to the target population; and it lacks the stigma and negative associations that many of these adult learners have with school buildings and traditional classrooms.

Another special attribute is the concern and respect shown by staff for students. This concern is manifest in a number of ways and throughout the various parts of TLC, from intake through follow-up. TLC has made a special effort to make initial contact easy, supportive and non-threatening. Staff explicitly and expressly consider friendliness and support to be part of their instructional responsibilities. The follow-up process of contacting learners when they cease to be active has communicated to these learners a continuing sense of interest in them, and in identifiable cases that follow-up has specifically contributed to the return of those learners to TLC.

**Careful planning**

The Technology for Literacy Project was the result of a year of study and planning. The study and planning period included a national search for ideas; local adaptation of those ideas; and direct design of the project with community input. The careful planning period, taking time to consider what ought to be done at what level, and on what scale, appears to have paid off in effective implementation.

**A culture of learning**

The final factor in this list of characteristics which have contributed to TLC's success is the organizational culture of learning created at the Center. This culture of learning applies to both staff and students. The staff has established an environment of high expectations where learning is expected to happen. The environment is not a place for schooling, but a place for learning. This distinction is understood by learners even in the tendency to refer to participants as "learners" rather than "students". Learners understand from staff that discipline and time-

on-task are necessary for learning to occur, so staff push for learners to take their learning seriously and to put in at least four hours a week, especially at the beginning.

But this is also a learning environment for the staff. The organizational culture has included getting the staff to buy into the vision of the technology and of the organization as a learning environment. There are clearly expectations that staff will learn--learn about computers; about software; and about how adults who are functionally illiterate can learn with computers. There is a clear understanding that technology will become obsolete, so there must be ongoing development and learning to keep up with this rapidly changing field. Learning means adaptation and change based on that learning. The director and staff came into the project expecting to learn, to grow and to change. They have created an organizational culture of openness, flexibility, reflection, and commitment to make it work. This positive, affirming organizational culture of learning is a special factor contributing to the success and effectiveness of the Technology for Literacy Project.

**Issues for ongoing discussion**

This evaluation, as a summative evaluation, has not focused on recommendations for program improvement. The formative evaluation effort has done, and continues to do, a good job in this respect. The issues in this section have emerged during the summative evaluation as areas which deserve particular attention as TLC looks to the future.

**Effective use of volunteers**

The Basic Reading Program depends heavily on volunteers. These volunteers, for the most part, are not familiar with computer-assisted instruction. They have not been effective, on the whole, in helping learners make the transition from instruction based primarily on tutors to computer-assisted instruction. Thus, one important program issue is the relationship of volunteers to the technology in the Technology for Literacy Center.

**Outcome measures**

The primary outcome measure remains grade-level achievement gains. There are serious problems with this measure and with the standardized achievement test. The field needs definitions of progress, achievement and outcomes that are criterion-referenced and specific to the instructional program and technology being used. Grade levels are not the basis for the instructional program and should not, I would argue, be the basis for measuring achievement. The field needs a definition of literacy, of functional literacy, and ways of measuring progress towards literacy which might be expressed, for example, by levels or percentages of literacy. This is an area where TLC can exercise leadership and create measures not only for accountability purposes but to better assist learners in setting goals and monitoring progress. Such an approach would also help with the problem of defining "completion."

**Staff development and stress**

There is evidence of staff stress. It was not the purpose of this study to focus on stress, nor is it possible to say whether the stress is greater or lesser than that for other groups. Nevertheless, an issue for

ongoing discussion is how to facilitate staff development and learning in ways which include the staff's ability to deal with stress both collectively and individually.

**Future funding**

One major purpose of this report is to inform decisions about future program funding. Such decisions in these times of very limited resources are never simple. The summative cost-effectiveness evaluation study undertaken by Dr. Lewis will also be important in informing funding decisions.

It is clear that TLC is effective for an important part of the functionally illiterate population. In that regard, then, it would be easy to recommend that TLC receive continued funding. But funding involves a decision about not only whether something works, but how valuable it is in relation to competing needs, not only in education but in the full range of human needs. I have stopped short of making a recommendation about future funding because I expect the Donor Review Board to be in a better position than I am to use this report and weigh competing demands to make funding recommendations and decisions.

In that context, one issue that is likely to take on increased importance in the future is the extent to which TLC should be a completely free service to learners. In the focus group interviews some learners indicated a willingness to contribute modestly towards the costs of the program. Others opposed any charges. It is certainly in society's interest to have adults know how to read and so a case can be made for free access to adult literacy programs in the same way in which public education is publicly supported. But it is also in society's interest to be

sure that a program like TLC survives, and survival may depend in the future on some kind of sliding scale learner contribution to defraying costs.

This report notes that a large proportion of the TLC target population is financially distressed. Direct learner contributions can never be the primary source of revenue for this kind of program. The issue, then, involves the ways in which some very modest degree of learner payment would affect participation as well as program survival. In the context of our times, this funding issue takes on multiple dimensions including the responsibilities of adults to contribute for services received when they are able. Let me make it clear that I am not recommending that learners be charged in any way for TLC services. Rather, I am observing that this is already an issue of discussion among learners and staff, and that such ongoing discussion would be well served by careful deliberation and study of options and consequences. Such considerations will be part of the context, I expect, for computer-assisted adult literacy education over the long term.

The fine and comprehensive cost-effectiveness evaluation of TLC conducted by my summative evaluation colleague, Dr. Darrell Lewis, provides much important information to inform discussions on and decisions about TLC funding specifically and computer-assisted adult literacy programs generally.

**Final personal reflections**

I have appreciated the opportunity to be involved in this external summative evaluation. I have appreciated that opportunity not only because of the high quality of the program and its staff, but also, as

noted earlier, the high quality of the program's evaluation system. TLC is making a major contribution in helping adult learners understand that learning to read need not be threatening, but rather, can be affirming and growth-producing. Likewise, TLC has demonstrated that evaluation need not be threatening and punitive, but can be--and should be--useful, affirming and growth-producing.

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# Benchmark Cost Descriptions of the Technology for Literacy Project

*Darrell R. Lewis, Cost Effectiveness Evaluator*

What does it cost to conduct the various programs and activities of the Technology for Literacy Center (TLC), and what might it cost to replicate these programs in an alternative setting? More importantly, how do we know whether we are "getting our money's worth" from the project? Such questions dealing with expenditure accountability and cost-effectiveness are increasingly being focused at all levels in education and are not unique to this project. Reliable and complete cost information is essential for educational decision makers to plan and assess their educational programs and services.

There are many important educational management decisions that can be better informed by the availability of cost information. First of all, such information helps in identifying inefficiencies in resource use and in suggesting needed improvements in the curricular and instructional design for each area. Second, cost information aids in determining whether certain instructional services are feasible given whatever budget or cost constraints might exist within the program or district. Administrators and policy makers need to know unit costs, for example,

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Special acknowledgement must be given to Dr. Stacey Hueftle Stockdill, formative evaluator for the project, for her extraordinary assistance in the inventory and measurement of resources, collection and measurement of outcomes data, and cheerful colleagueship.

in order to make decisions about program and service area expansions and contractions. They need to know what it costs to provide a particular service or program for different students with differing needs. They need to know what it might cost to replicate the program in an alternative setting. And third, such cost information also contributes to a determination of the project or instructional service area's overall value (i.e., whether the project or service area is worth the cost) when linked to the outcomes or benefits of the project or instructional activity. Cost information is essential for any type of subsequent cost-effective or cost-benefit comparison of alternative instructional activities. Although this report does not address a formal cost-effectiveness analysis, cost information and cost benchmarks are essential for any such subsequent evaluation either within TLC or in alternative settings of adult basic education.

In order to assess the cost consequences of the adult basic literacy program at TLC one needs first to establish a workable framework by which to assess the direct resource requirements for each function and instructional activity, along with a method for translating these requirements into cost estimates; and second, one needs to collect program data for subsequent cost-analysis and the establishment of benchmarks. Such a framework for the establishment of cost benchmarks is presented in this report.

A set of questions was developed to guide this report in targeting its design, data collection, and subsequent analysis. Basically the questions revolve around four general concerns: What are the resources employed and the costs of these resources in the delivery of technology assisted

basic literacy instruction for adults at TLC? Who bears the burden of these costs? What might be the resource costs for replicating TLC instructional programs in an alternative setting? And, what cost data are needed as benchmarks for any subsequent cost-effectiveness (i.e., efficiency) comparisons of TLC's programs with other like activities elsewhere?

In the context of these four general concerns, we focus the cost model and data collection on the following specific questions:

(1) What are the total resource costs to society, in both cash and imputed values, for each of TLC's program functions and service areas?

(2) What are the total resource costs to society for the direct instructional programs in TLC and for each of its constituent instructional service areas?

(3) What is the average per student expenditure per year for all of the direct instructional technology assisted literacy programs provided by TLC?

(4) What are the average costs per student hour of instruction, per modules or courses mastered per year, per personal goals completed per year, and per grade level change?

(5) What are the factors that explain variations in costs for each of these instructional programs?

(6) What benchmark data are most needed for subsequent analysis in the comparison of these programs with other similar efforts?

(7) Who bears the financial burden of these costs?

(8) What were the development and start-up costs for TLC as compared to recurring instructional program costs? Which of these start-up and recurring instructional costs would be required for replication?

(9) What were the economic consequences (i.e., efficiency considerations) of using technology assisted instruction relative to more labor intensive methods? At what costs and for what benefits can technology (primarily computer assisted instruction) replace labor in the instructional process for adult literacy at TLC?

## METHOD AND SOURCES OF DATA

The cost analysis technique employed in this report is a resource components approach to costing out educational programs. This approach requires the listing of a comprehensive set of all the functional activities and educational services within the project; the determination and measurement of the specific resources that are employed within each of these functions and instructional service areas; and the valuing of these resources to determine function and instructional service area costs. Tables 1 and 2 illustrate this costing paradigm and identify the essential component of the cost model for all resources used for all the functions performed by TLC and the project during 1986-87.

Tables 3 and 4 illustrate the distribution of these resource costs across the six functional activities of the project (i.e., direct instructional services, external training, research, curriculum development, incentive grants, and evaluation). In turn, Table 5 illustrates the distribution of resource costs across the six direct instructional service and program

areas of TLC (i.e., basic reading, grades 5+ reading, math, math and reading, other programs, and intake only).

Table 6 examines the total of all direct instructional costs within the TLC project and illustrates their standardization and linkage with instructional outcomes. On the basis of these direct instructional cost data and the number of students, instructional hours of service, grade level changes, modules or courses mastered, various annualized and averaged per student unit costs are estimated.

With some variations this approach to costing of educational programs has been applied recently to computer assisted instruction by Levin (1986) and to special education by Chambers and Hartman (1983), Kakalik, et al. (1981), and Lewis, et al. (1986). A variation of this approach also has been developed under the name of the "Resource Cost Model" by Chambers and Parrish (1984) for use as a cost model for state level school finance. However, few other cost studies in education have used such a "resource components" approach. Unfortunately, no other study in adult or community education has employed this approach.

Most other cost studies in education have simply taken their data directly from school district budget records according to summary budget categories without regard to the actual allocations of resources employed or without regard to any imputed value for district or other donated or social resources which might lie outside of the district cash budget. Moreover, most previous studies dealing with educational costs have attempted to examine only the program costs of a category or service area without regard to multiple service to students, to differences in services by grade levels, or to variations in actual student use of services

within particular service areas. Consequently, many service areas within education and many categories of resources were simply ignored, left out of the analyses, or confounded within total budget considerations.

It is expected that another local school district or adult basic literacy project could replicate the paradigm and cost analysis of this report for its own purposes with only minimal effort in data collection. All of the primary components for the cost analyses employed in this report are illustrated in the report and are in the form of actual algorithmic micro-computer templates such that they could be replicated. [The templates were developed on an Apple IIe micro-computer employing Appleworks software and are available from the author.] All of the resource and cost data inputs employed in this report are currently available in some form in almost all school districts.

The information and data on the resources employed and their respective costs were collected through examination of school district and project budget and expenditure records, project and funding agency reports, and discussions with key district and project personnel. Similarly, information and data on students and program service areas were collected through examination of project records, evaluation reports prepared by the internal formative and external summative evaluators, and discussions with key program personnel. All resource and cost data were collected from the July 1, 1986-June 30, 1987 fiscal period for the St. Paul Public Schools. All student and program service area information and data were collected from the June 1, 1986-May 31, 1987 program period for TLC. In annualizing these data, it was assumed that the resources employed during the month of June, 1987 were similar in

amount and type to those used in June, 1986. In addition, some average student performance data were estimated from a follow-up study on all participants from a three month sample period between September and November, 1986. These sample data were reported in averages and assumed to be constant throughout the year for the July 1, 1986-June 30, 1987 period.

A number of other assumptions within this report were required concerning school district and community resource allocations and their assignment within and to each of the TLC service functions and instructional areas, and to their valuation. The most important of these assumptions and procedures for cost estimates are summarized in Table 2 and in the footnotes to Table 2. Other data adjustments and sources are noted in each of the other tables within this report.

## SOME BENCHMARK COST DESCRIPTIONS

### Cost of the total project in 1986-87

Employing a resource components approach to the identification, measurement and valuation of all resources used within the project during 1986-87, it is estimated that costs totaled approximately $532,338 for all of the functional activities which the project serviced. These annualized total costs for the project differ from the foundation budget (as identified in Table 8) by $65,544 for several reasons. As illustrated, the annualized costs for TLC managed resources ($471,973) differ from the school district cash budget ($413,299) by $58,674; and they exceed the total project budget ($466,794) by an additional $6,870 when overhead expenses incurred by the school district are counted. Beyond the normal

differences between proposed budget and actual expenditures, review of Table 8 indicates that the explanation rests largely with our annualization and accounting of costs for start-up, furnishings, technology equipment and software, instructional materials, and an inputed value for the volunteer tutors and school district maintenance of the facilities. These costs, along with the costs of facilities and overhead, in total represent over 24 percent of all project costs and are often overlooked by others when reporting on their adult literacy and community based project costs. In Table 5 we find that such often overlooked costs represent over 28% of all direct instructional program costs at TLC.

The fact that these resource costs and circumstances are often overlooked is clearly evident in the survey of literacy programs for Minnesota which was recently prepared for the Minnesota Adult Literacy Campaign by Richard Chase (1987). In this survey only brief reference and very rough aggregated estimates are given for the "cash budget" costs of these programs. Given the results at TLC, these budget estimates are likely underestimated by at least 25% or more. In this survey for the state, excepting average student cost estimates, no other linkages were made between estimated budget costs and student participation rates or performance data. Complete, accurate, and comparative resource and expenditure data for adult basic education simply are not currently available. Garrison Keillor may believe that Minnesotans are "above average" in everything, but in the area of cost estimations for adult basic education we are clearly at the national average.

Indeed, in the current Minnesota State Plan For Adult Education (1985) dealing with the goals and objectives for this educational area,

surprisingly little attention is given to the need for more and better cost data and cost analysis of the type described in this report. Although the term "cost-effectiveness" appears in a goal statement heading, no attention or linkage is given to this concern in any of the operational objectives stated. Accountability of how funds are to be spent and concerns for program effectiveness are highly visible in the Plan, but virtually no attention is given to the more fundamental issues of efficiency and cost-effectiveness. Even in the Plan's discussion of "assessment and evaluation findings" little concern was expressed as to the lack of information concerning these latter issues. As with most other instructional service activities in education, little attention or concern has been given to costs and cost-effectiveness in adult education.

**Costs of direct instructional services at TLC**

When all of the annualized costs of the project were totaled, it was found that approximately 62% (or $332,115) of all TLC resources were used for its primary project activity of direct instructional services (see Table 4). The remainder of the resources and costs were allocated to the other functional areas of TLC's mission relating to training, research, dissemination, development, and evaluation. It was found that 8% of all resources were devoted to external training, 7% to research, 6% to incentive grants, 7% to curriculum development, and 9% to evaluation activities. In this proration of costs, it is important to recognize that significant amounts of TLC's resources were used for both curriculum development and evaluation activities throughout the project period. During 1986-87, for example, $37,454 and $51,289 in costs were incurred on behalf of these functional activities. Although these functions were

not among the four major program or service components, they were both integral parts of the project's overall mission. Consequently, such costs need to be separately counted and partialed out from the costs of the other programmatic activities.

In turn, allocations of the costs for direct instructional services were estimated to be 22% for the basic (i.e., Laubach) reading program, 42% for the grades 5+ reading program, 16% for the math program, 12% for the combined math and reading program, 5% for other programs, and 3% for servicing intake only (see Table 5). These allocations were estimated and prorated primarily from the measured student hourly use of each program area. Based on these prorations it was found that approximately $80,044 in project resources were devoted to the basic reading program, $135,733 to the 5+ reading program, $51,716 to the math program, $38,774 to the combined math and reading program, $16,151 to other programs, and $9,697 for servicing intake only.

The total instructional staff at TLC included 3 full-time and 16 part-time licensed teachers and 7 part-time educational assistants over the course of the program year. Within this total group were a curriculum developer, reading specialist, technology consultant, lead instructor, and coordinator of volunteers. There were also 87 part-time volunteer tutors assisting in instruction during the year and one full-time project coordinator/director. When these personnel were expressed in full-time equivalents (FTE), they represented 6.50 FTE licensed teachers, 3.04 FTE instructional assistants, 2.04 FTE volunteer tutors, and 1.00 FTE project coordinator/director (see Table 7). When their time and efforts were adjusted for participation in all of the different project functions

and activities, it was estimated that direct instructional programs received services from 4.88 FTE licensed teachers, 2.13 FTE instructional assistants, 1.94 FTE volunteer tutors, and .40 FTE coordinator/director. These direct instructional efforts totaled 9.34 FTE and $241,979 in personnel costs.

The variations in costs across the instructional programs were largely a function of the number of students and their participation rates in each program area. Because all of the instructional programs, except the basic reading program, were heavily technology based, the use and costs of this technology varied directly with student participation rates. The only notable exception was in the basic reading program where the computer was used only as a supplement in instruction. Based on actual measurements, it was estimated that participants in the basic reading program used the computer only 39% of their instructional time as compared to over 90% of the time by participants in the other instructional programs. On the other hand, all of the volunteer tutors employed in the instructional programs were used exclusively in the basic reading program. Appropriate adjustments in the allocation of these resources to this program area were made in the resource allocations and cost computations of Table 5.

In the case of the basic reading program, it is instructive to note the resource costs of this trade-off of computer time for instructional labor time through the use of volunteer tutors. When the time usage and costs of these resources are estimated for both computer time and the time of volunteers, the ratio of resource costs exceeds one to ten (i.e.,

$1,730 of cost savings in computer usage are traded for over $20,000 in increased volunteer tutor costs).

Contrary to conventional wisdom, the use of volunteer tutors has not been a cost free resource for the project at TLC. It was estimated that the cost of volunteer tutors for the basic reading (Laubach) program was over $30,000 when all resources, including an imputed value for their time, were accounted for in the framework. When counting only the costs for training and coordinating the volunteers, annual costs were estimated to be between $20,000 and $22,000. It was estimated that training each of the 87 volunteers over 12 hours for tutoring in the Laubach program costs at least $20 per participant. With an annual turnover rate for volunteers of at least 50%, these training costs were estimated to be at least $1,000 per year. In addition, annual coordination costs were estimated to be at least $18,000 for a 75% FTE staff member for orientating and coordinating these 87 volunteers and for resource assistance from secretarial staff, supplies, a newsletter, postage, telephone and the like. These costs for volunteers represent the total costs for two FTE tutors and are approximately one-half the average unit costs of other instructional personnel.

The data in Tables 6 and 7 represent the most useful benchmark data in this report because they present estimates in standardized and unit terms. When student participation and performance data are linked with the cost estimates we are able to estimate a number of input/output benchmark ratios.

It is important to note at this point that we still do not have adequate data for formally assessing the cost-effectiveness of TLC's

instructional programs because we lack an appropriate comparison group with controlled design and verifiable data for such an analysis. In this report we have only benchmark ratios based on only one sample group. It is also important to note that these ratio estimates must be viewed with caution because they are based largely on "averages" of student participation and performance and these averages include significant variations between individual students.

As noted by the summative evaluation report, the large variations in achievement and instructional hours for individual students does indeed indicate that "there is no average student at TLC." With standard deviations greater than the average performance and participation rates in almost every case, such data must be viewed with much caution. Because the average cost data reported in Tables 6 and 7 are largely a function of these same variations and limited correlations, one must also view these average estimates with the same degree of caution as noted in the summative evaluation report.

Costs of learning time

Learning time needed to make gains in adult literacy is a critical dimension in any set of cost considerations. Until recently, whenever attempts were made in the adult education literature to link student participation rates with cost data, such information was almost always reported in annual per student terms. Given the wide variance of program settings and activities in the field, data reported in this manner are only slightly more informative than gross budget estimates. Only a few other project directors and evaluators have begun to think about the time and costs needed to make gains in adult literacy programs (Balmuth,

1987; Mikulecky, 1986; and Sticht, 1982). A thorough cost-analysis of any educational project or program needs to collect cost information in standardized form and a useful way to accomplish this is through unit costs of instructional time.

At TLC the average cost per student per year for all direct instructional services was estimated to be $365 when all resource components were added into the framework. Although other average per student costs in 1986 dollars have been reported in Minnesota to be $383 among AVTI programs, $290 among community college programs, and $177 among school based AB/CE programs (Chase, 1987), these are only very rough cash budget estimates and likely represent major underestimations of total resource costs. As noted earlier in this report, these other reported costs are probably underestimated by at least 25% or more. If, for example, we measured only the cash budget components used for the delivery of instructional programs at TLC in parallel fashion to the other reported costs in Minnesota, and ignored all costs for donated equipment and volunteer time, facilities, and all forms of amortization and overhead as identified in Table 6, the costs per student would be approximately $264 for TLC.

While keeping in mind the caveats noted earlier about the variance among individuals, we can estimate from the summary data in Table 7 that the average cost per instructional hour per student for all forms of instruction within TLC is approximately $20. In one other recent study wherein a similar resource components approach to costs was taken and actual student hours of participation were measured for a large suburban public school district in Minnesota (Lewis, et al., 1986), it was found that

average costs per instructional hour per student for regular public school instruction for all subjects was approximately $5.50 per hour when adjusted to 1986 dollars. In this same study, instructional hourly costs per student for all programs in special education (again expressed in 1986 dollars) were estimated to be $15 and between $14 and $15 for the instruction of "emotionally disturbed" and "learning disabled" secondary students. Average costs per student in adjusted 1986 dollars were reported to be $3,815 for all special education programs in the special education study.

It is important to remind the reader at this point that the adult population served by TLC is not only very different from those students being served by special education in our schools, but the instructional setting is very different as well. As noted in the summative evaluation report, "TLC is a voluntary program requiring self-motivation and personal initiative. It takes time, effort and a certain amount of discipline." Students in public schools, on the other hand, are required to participate in blocks of instructional time every day over the course of their schooling careers. Per student costs and hours of instruction under these circumstances reflect different rates of actual participation and involvement. One should anticipate that average costs per student under these circumstances would be significantly higher and average hourly costs would be significantly lower than those normally expected in voluntary and community based adult education programs.

Although less meaningful because of the great variation in student performances, we also are able to estimate for TLC that the average cost per module mastered per year for all forms of instruction is $561, average

cost per course mastered per year for all forms of instruction is $1,876, and the average cost per personal goal completed per year is $4,613 (see section III in Table 7).

The summative evaluation report for this project also has reported on instructional outcomes in the standardized form of average hours per change in grade levels for a number of TLC's instructional programs (see Tables 6 and 7). With these average hourly estimates tied to outcomes and the cost data in this report measured in hourly form, it is possible, in turn, to estimate the average costs per grade level change. We have estimated these average grade level change costs to be approximately $1,060 for all the instructional programs, $1,260 for the basic reading program, $1,040 for the grades 5+ reading program, and $900 for the math program. The basic reading program appears to be less cost-effective than the other programs at TLC both because of its higher student instructional hours needed for grade level changes and because of its higher labor intensive instruction. Hopefully, these cost estimates will serve as benchmarks for similar cost assessments of other like programs.

Although inappropriate for the framework of cost-analysis in this report, if we should use TLC's instructional cash budget in parallel fashion to most other reported costs in the adult literacy literature, and if we should discount all accounting for donated equipment and volunteer time, facilities, and all forms of amortization and overhead as identified in Table 6, the average cost per instructional hour within TLC would be approximately $15. In turn, the average cost for each grade level change for all programs would be reduced to approximately $795.

Comparison of TLC costs with other projects

A literature review revealed very little in the way of relevant comparative data on costs from other projects providing adult basic literacy instruction. Only two other studies (Darkenwald, 1983; Deveaux, 1985) reported even the most basic budget information which might be used for comparative purposes and cost analysis of the type described in this report.

When budget costs are reported in other studies and surveys relating to literacy instruction, they are reported almost always only in annual per student and cash budget terms. These circumstances are partially the fault of the reporting requirements for educational systems in most states. Most state departments of education are legislatively tied to their state's fund accounting system and to the Uniform Financial Accounting and Reporting System (UFARS) for state governments which require most schools to report in very specific ways. Most school based data, for example, are required to be reported in "per student per year" units and are unrelated to the most important evaluation needs in the field of adult and community based education. Unfortunately, these circumstances are also the fault of most other project administrators in adult education. They simply fail to collect and report adequate cost data.

In one of only two other studies with some comparative and usable cost data, the Bronx Educational Services (BES) project, a similar community based adult basic education project with regular classroom instruction in the Bronx of New York City, reported that their three-year cash budget for the period 1981-84 totaled $318,500 (Deveaux, 1985). It also was reported that 1983-84 expenditures were $97,990 and 111

students participated in 18,306 instructional hours during the year. After converting their budget into 1986 dollars and adjusting their budget downward for development and evaluation allowances with the same proportions as at TLC, but making no adjustments in their instructional costs for start-up amortization, or for any donated facilities, furnishings, promotion activities, instructional materials or labor time, average annual per student costs were estimated conservatively to be at least $853 and average hourly costs of adult basic instruction at BES were estimated to be at least $6. The BES project also reported that students averaged one grade level of improvement in basic reading for every 100 to 142 hours of instruction received. When using the above cost and hour estimates for BES it can be estimated that BES costs would be at least $600 and probably greater than $852 per grade level change. These cost estimates, however, must be viewed with considerable caution and uncertainty because they are likely underestimated by at least 25% if a resource components approach had been used for their estimation.

In one other similar adult basic reading project, the Functional In-Service Training (FIST) project attempted to report on cost estimates relating to their college and community based activities (Darkenwald, 1983). They have argued that because their program is largely based on volunteers providing one-to-one instruction at off site locations throughout the community, there is only the marginal cost of student materials and a modest amount of cost for training the volunteers. Nowhere in their report do they account for start-up amortization, program and institutional overhead, or the basic costs for program promotion and coordination (i.e., telephone, office, postage, supplies and

the like). If we adjust their reported budget to 1986 dollars and account for some of these costs with the same proportionalities as at TLC, along with the resource costs for volunteer time, it can be estimated that FIST per student costs would be at least $670 and average hourly costs of instruction would be at least $7. These average costs are five times greater than what they reported as marginal costs. Data in the FIST project report indicate that their students averaged one grade level in improvement in basic reading for every 59 hours of instruction. If the cost estimates for FIST are reliable, the costs per grade level change at FIST would be $413. Again, great caution must be given to these cost estimates because of their unreliability.

Unfortunately, we have been unable to uncover similar hourly cost data for any of the other community or public school based adult literacy programs within the state or nation, or for any of the other national demonstration projects which employ computer-based instruction in their adult literacy programs. We were unable, for example, to convert the rough marginal cost estimates given in the Jefferson County Adult Reading Program (JCARP) and ABLE program reports into usable and reliable average cost data because of limited information.

Table 11 presents a brief review of these benchmark cost ratios for the one TLC program in adult basic reading instruction and compares them with the two other similar programs reported above (i.e., BES and FIST). Although the estimates for TLC's costs per grade level change appear to be higher than those of the two comparison programs, the reader must be reminded again that these comparative results must be viewed with great caution because both the cost and hour estimates for

BES and FIST are very rough estimates; costs in the comparative programs are likely to be significantly underestimated while instructional hours may be similarly overestimated. Making allowances for these likely errors in estimation, it appears that the results at TLC are only slightly less cost-effective than those in the two other programs and are consistent with the summary results of the summative evaluation report.

## WHO BEARS THE COST BURDEN OF TLC?

A critical dimension often overlooked in reviewing the costs of instructional programs has been the issue of "perspective." The issue of perspective involves the question of who bears the burden of costs. Accordingly, Table 9 represents the allocation of all of TLC's annualized costs to each of its constituencies in the examination of this issue.

Contributions and donations made by the school district and other agencies during the start-up period (i.e., January 1, 1985 through June 30, 1985) are accounted for in the annualized costs identified as "amortizations" (i.e., start-up amortization, furnishings amortization, instructional technology, software and other materials amortization). Unfortunately, costs to individual students are not accounted for in this framework because of the lack of time and money to collect such data. However, it is important to note that these costs are often quite substantial when one identifies and measures the value of their travel, personal supplies, child care, and possible foregone earnings for participation and study time.

The accounting framework in Table 9 indicates that approximately 24% (or $126,605) of the annual costs for all of the project's activities

were either paid for by the school district or donated by the school district and private individuals. In this case, the public schools have shared costs in the development and demonstration of TLC in important ways beyond just their cash contribution to the project.

## WHAT MIGHT IT COST TO REPLICATE TLC?

From the outset, TLC has been intended to be a development, demonstration, and dissemination project in the use of technology for community-based adult literacy instruction. Consequently, a critical issue concerning replication is cost. What might it cost to replicate the TLC instructional programs? More specifically, what should another school district or community based adult education program budget for both start-up and for recurring expenses if they wish to replicate TLC?

These questions are addressed in Table 10 where both actual and estimated start-up replication costs are presented. The cash start-up costs (i.e., cash needed for the hire of staff, the purchase of equipment, and the remodeling required prior to the beginning of operations) recommended for replicating the five instructional programs of TLC have been estimated by the project director to be at least $190,000 if it were to be replicated in a community-based setting similar to the existing location of TLC, and at least $175,000 if the project were located within a public building and both facilities and furnishings were donated without costs.

These start-up replication costs are about 25% less than those cash costs identified as the actual start-up costs for TLC for several reasons. First, some adjustments of the original purchases of instructional

technology would need to be made because of up-dated technology and, in some cases, lower costs. Second, the project director recommended that at least 20% of the total instructional technology, software, and print materials inventory identified in Table 10 should not be purchased at the outset of the project, but rather purchased over the first three years so as to adapt to changing needs, new technology, and new materials. And third, the project director recommends that at least 50% of the time and effort used during TLC's start-up period, especially for the identification of materials, curriculum development, evaluation, and training initially needed for the development of TLC, may not be needed in replication. Some amount of facilities remodeling, especially for the technology adaptations, would be necessary in either a community setting or school building. Although it may be likely that less remodeling would be necessary within an existing school building if the space configuration could accommodate individualized instruction, the summative evaluation report notes the critical nature of setting and environment relative to the programs success and this may not be a viable option.

The data in this cost report indicate that the recurring resource costs of TLC for all of its direct instructional programs would be at least $330,000 on an annual basis for approximately 900 adult students. These recurring instructional costs assume that little attention and effort in the replication would be given to the other functional activities of TLC relating to development, training, dissemination, research, and external evaluation. We are assuming that for the current level of instructional activities (as noted in Tables 3 and 4) fewer resources and less space would be needed for the replication of the instructional programs alone.

If cash budget considerations were the only cost concern for replication, it is estimated from the data in Table 6 that at least $265,000 in a recurring cash budget would be needed for a community-based rental setting and $240,000 would be needed for a school-based (or donated space and furnishings) setting.

The fact that TLC is community based and renting commercial space has been mentioned by some observers that this may make the project "too costly" for replication. Data in this report indicate that this cost concern has little foundation. Although the total annual cash rentals by TLC averaged over $40,000, when remodeling amortization and space used for non-instructional purposes are removed from the rent costs, costs for rental space are estimated to be only about 5% of instructional costs.

## COST CONSEQUENCES OF TECHNOLOGY AT TLC

Contrary to most conventional wisdom about instructional technology, the recently expanded use of micro-computers in education generally has not contributed a great deal to educational costs (Lewis, 1985); and the use of such technology at TLC is no exception. Although the initial costs for the hardware, software, instructional furnishings, and remodeling necessary for instructional technology at TLC totaled $141,259, when these costs were annualized over time (even while compounding at 7%) they averaged only $37,014 per year. In turn, when these annual costs were adjusted for their other uses relating to TLC's mission, instructional technology costs averaged $26,137--or only about 8% of all instructional costs (see Tables 6 and 7). When these technology costs were allocated across all the instructional hours provided by TLC over

the year, average technology costs per hour of instruction were approximately $1.60. It is important to note from Table 7 that the average annual instructional costs for technology at TLC were approximately equal to the cost of one full-time instructor. The use of technology at TLC does not represent a major cost center for their programs.

It is also instructive to observe that the ratio of labor costs to technology at TLC is approximately 9 to 1 (i.e., the costs of the 9 FTE instructor units actually employed at TLC are approximately equal to nine times the total annual costs of technology). This resource mix of 9 to 1 may be essential for the continued success or replication of TLC. Although TLC is a "technology based learning center" with computer assisted instruction (CAI) as a central and essential part of its instructional activities, it is also clear that TLC is still a highly labor intensive instructional program.

A useful way to test the importance and cost-effectiveness of CAI as an instructional resource at TLC is to ask the director, or any of the other core staff, whether they would be willing to trade-off all of TLC's computer assisted instruction for one more full-time instructor. The answer already given to this writer has been a resounding "No!" More realistically for the future, what additional technology might the program adopt as a replacement for existing labor time and costs?

As is often the case, technology costs at the margin may not be highly significant but their contributions to outcomes may be very important and highly valued. One must assess these costs of technology in light of their perceived benefits and their value added to instructional

outcomes. The summative evaluation report through its recording of participant observations indicates the clear value of TLC's technology to the value added for learning reading and math, for its contributions to a favorable learning environment and student motivation, and for its contributions to learning skills (e.g., keyboarding) beyond math and reading. These additional dimensions of benefits are difficult to partial out of the measured gains on cognitive achievement, but they are vividly illustrated in the case studies and participant comments. The added costs of technology may be necessary and critical to the success of some adult students--even if only for motivation purposes.

## IN SUMMARY

The most important observations concerning the benchmark estimates and cost-analyses of this report can be summarized in the following points:

<u>What does it cost to conduct the programs at TLC?</u>

The first major observation in this report was that the project annually employs almost 14% more resources (or approximately $65,000 in added resource costs) than are reflected in the annual cash budgets of the project. Beyond the normal differences between proposed budget and actual expenditures, this report indicated that the explanation rests largely with the annualization (i.e., amortization) of costs for project start-up, furnishings, technology equipment, software, and instructional materials. These costs, along with the costs of facilities and overhead, in total represent almost 25% of all project costs and are often overlooked

by others when reporting on their adult literacy and community based project costs.

The report also found that only about 62% of all TLC resources were being used for its primary project activity of direct instructional programs for adult literacy. The remainder of the resources and costs were allocated to the other functional areas of TLC's mission relating to training, research, dissemination, development, and evaluation.

**How do the costs at TLC compare with other similar programs?**

At TLC the average cost per student for all instructional programs was estimated to be $365 when all resource components were added into the framework. Although other average per student costs for adult education have been reported to be between $383 and $177 in Minnesota during 1986, these are only very rough cash budget estimates and are likely major underestimations of total resource costs. If, for example, we measured only the cash budget components used for the delivery of instructional programs at TLC in parallel fashion to the other reported costs in Minnesota, and ignored all costs for donated equipment and volunteer time, facilities, and all forms of amortization and overhead, the costs per student at TLC could be estimated to be $264.

The summative evaluation report for this project also reported on the number of student instructional hours provided over the year and on instructional outcomes in the standardized form of average hours per change in grade levels for a number of TLC's instructional programs. Given these data and the cost estimates of this report, we estimated the average hourly cost of instruction at TLC to be approximately $20. In one other recent study wherein a similar resource components approach to

costs was taken and actual student hours of participation were measured for a large suburban public school district in Minnesota, it was found that average costs per instructional hour for students in special education were estimated to be approximately $15. Nevertheless, the average costs per instructional hour at TLC were estimated to be on the high side of most similar types of programs in adult literacy.

With these average hourly estimates tied to outcomes in the form of average hours per grade level change, and our cost data measured in hourly form, it was possible, in turn, to estimate the average costs per grade level change at TLC. With a number of caveats about the use of averages, we estimated these average costs per grade level change to be approximately $1,060 for all the instructional programs at TLC. It was noted that if we had used only TLC's instructional cash budget in parallel fashion to most other reported costs in the adult literacy literature, and if we had ignored all accounting for donated equipment and volunteer time, facilities, and all forms of amortization and overhead, the average cost per instructional hour within TLC would have been approximately $15. In turn, the average cost for each grade level change for all programs would have been reduced to approximately $795.

A literature review revealed very little in the way of relevant comparative data on costs from other projects providing adult basic literacy instruction. Only two other studies reported even the most basic budget information which might be used for comparative purposes and cost analysis of the type described in this report. Although the estimates for TLC's costs per grade level change appear to be higher than those of the two similar programs, the reader must be reminded that the

comparative results are very rough estimates; costs in the comparative programs are likely to be underestimated by at least 25% while the instructional hours reported may be overestimated. Making allowances for these likely errors in estimation, it appeared that the results at TLC were only slightly less cost-effective than those in the two other programs. Instructional "efficiency" at TLC, when measured in dollars, appears to be in the same "ballpark" of other like programs in adult basic literacy!

**How has the burden of costs been shared in this project?**

Although private foundations and companies made the major dollar contributions to this project, the accounting framework in this report indicates that approximately 24% (or $126,605) of the annual resource costs for all of the project's activities were either paid for by the school district or donated in the form of time and materials by the school district and private individuals. In this case, the public schools have shared costs in the development and demonstration of TLC in important ways beyond just their cash contributions.

**What might it cost to replicate TLC?**

Replication costs for TLC's instructional programs are largely determined by instructional labor costs relating to participant volume, and its context and location. Assuming a volume, context and location similar to TLC, replication costs for TLC's instructional programs were estimated as needing at least $190,000 in cash for initial start-up and at least $285,000 in a recurring cash budget if it were to be duplicated in a community based setting with rental space and with the remodeling costs paid at the start-up. For a school based setting (with donated space and furnishings), it was estimated that at least $175,000 in cash would be

needed for initial start-up and at least $260,000 in a recurring cash budget.

What are the cost consequences of technology at TLC?

The use of technology at TLC appears to be a critical component of instructional programs, but at relatively low cost. When the annual costs for technology at TLC were adjusted for their other uses relating to TLC's mission, instructional technology costs averaged 26,137--or only about 8 percent of all instructional costs. Even if this report had made a 25 percent error in these cost estimates for technology, or if the program should expand or contract its use of such technology by 25 percent, these events would effect the total instructional costs at TLC by less than 2 percent. The average annual costs for technology at TLC were approximately equal to the cost of one full-time instructor.

The cost data in this report indicate that the ratio of labor costs to technology at TLC is approximately 9 to 1 and that this resource mix of 9 to 1 may be essential for the continued success or replication of TLC.

It is also instructive to observe that the total costs of volunteer tutors at TLC were almost equal to the total costs for technology; and the tutors were used in only one program while technology was central to and employed in all of the other programs. These costs for tutors do not include any imputed value for their time, but include only the direct resource costs for training and coordination. On the other hand, it appears that one can get two FTE tutors for the price of one teacher.

Although computer assisted instruction (CAI) appears to be a central and critical component of instruction at TLC (and it appears to be highly cost-beneficial on its own merits), the instructional programs at TLC are

still heavily labor intensive. The substitution of capital for labor in the instructional process at TLC does not appear to have resulted in major cost-efficiencies relative to the other programs examined in this report.

Technology costs at TLC may not be highly significant, but their contributions to outcomes may be very important, highly valued, and even critical to the success of some students. One must assess these costs of technology in light of their perceived benefits and their value added to instructional outcomes. These additional dimensions of benefits are difficult to partial out of the measured gains on cognitive achievement, but they are vividly illustrated in the case studies and participant comments found in the summative evaluation report. Technology appears to play an important and central role at TLC at relatively low cost.

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## APPENDIX FOR TABLES

Table 1: Annual Totals for all Resource Components in TLC

Table 2: Average Unit Costs of Resources in TLC

Table 3: Percentage Allocation of Costs to TLC Functions

Table 4: Dollar Allocation of Costs to TLC Functions

Table 5: Allocations of Direct Service Costs to Educational Service Programs

Table 6: Total Instructional Resource Costs and Activities for all Educational Programs

Table 7: Summary of Inputs, Outputs and Benchmark Ratios

Table 8: Reconciliation of Cash Budget with Costs of Resource Components

Table 9: Allocations of Costs to TLC Constituencies (Distributions of Cost Burden)

Table 10: Estimated Start-up and Recurring Costs for Alternative Instructional Settings

Table 11: Benchmark Cost Ratios for Adult Basic Reading Program

TABLE 1

TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987)
ANNUAL TOTALS FOR ALL RESOURCE COMPONENTS IN TLC

| Annual Cost | Ingredient |
|---|---|
| | PERSONNEL |
| $145,393 | [4.43] FTE licensed teachers with fringe benefits, contract |
| 50,077 | [2.07] FTE licensed teachers with fringe benefits, hourly |
| 27,246 | [1.50] FTE educational assistants with fringe benefits, contract |
| 22,840 | [1.54] FTE educational assistants with fringe benefits, hourly |
| 55,420 | [1.00] FTE coordinator with fringe benefits, contract |
| 42,652 | [2.00] FTE secretarial/clerical with fringe benefits |
| 11,732 | [2.04] FTE volunteers. Measured hours: [2,933] |
| [ 20,307] | Start-up amortization |
| | FACILITIES |
| [ 1,631] | Office furnishings amortization |
| [ 1,678] | Instructional furnishings amortization |
| 13,812 | Instructional and office space [3,453 sq.ft.] |
| [ 8,563] | Maintenance |
| 8,761 | Utilities and insurance |
| 14,567 | Remodeling amortization |
| | EQUIPMENT AND MATERIALS |
| [ 17,674] | Instructional technology hardware amortization |
| [ 3,095] | Instructional technology software amortization |
| [ 5,559] | Other instructional materials amortization |
| [ 2,127] | General and instructional supplies/tests |
| [ 165] | Equipment rental, repair and maintenance |
| | OTHER DIRECT |
| [ 10,005] | Postage and telephone |
| [ 2,397] | Printing and publishing |
| [ 5,766] | Speakers, workshops, travel and meetings |
| [ 506] | Other miscellaneous supplies and expenses |
| | OVERHEAD, INCENTIVE GRANTS AND OTHER |
| [ 16,600] | Overhead assumed by foundation |
| [ 6,870] | Overhead assumed by public schools |
| [ 26,406] | Incentive grants to other schools/agencies |
| [ 11,089] | Evaluation assumed by foundation |
| $532,338 | TOTAL TLC PROJECT RESOURCE COSTS PER YEAR |

TABLE 1 (CONT.)

FOOTNOTE: Data noted in [ ] are primary input data. All other cost data are derived from computations within a micro-computer spreadsheet template. The technical steps and assumptions in the derivation of these costs are identified and discussed in Table 2. All primary cost and FTE data were estimated from budget and expenditure records within the school district and program are for the fiscal period July 1, 1986 - June 30, 1987. Estimates for the months of May and June, 1987, were based on the pattern of expenditures for the preceding months and confirming estimates by project staff.

TABLE 2

TLC COST STUDY (DATA FROM JULY, 1986 - JUNE, 1987)
AVERAGE UNIT COSTS OF RESOURCES IN TLC

| Ingredient | Description | Components | Costs |
|---|---|---|---|
| [Personnel] | | | |
| Teachers (1 FTE) | Licensed teachers under contract | Average annual salary at 30 hours per week ($27,697) with fringe benefits | $32,820/yr |
| Teachers (1 FTE) | Licensed teachers under contract | Average annual salary at 30 hours per week ($21,600) with fringe benefits. (Average wage rate of $15 per hour) | $24,192/yr |
| Instructional aides (1 FTE) | Educational assistants under contract | Average annual salary at 40 hours per week ($16,320) with fringe benefits. (Average wage rate of $8.50 per hour) | $18,164/yr |
| Instructional aides (1 FTE) | Educational assistants under hourly rate | Average annual salary at 40 hours per week ($13,325) with fringe benefits. (Average wage rate of $6.94 per hour) | $14,831/yr |
| Program administration (1 FTE) | Program coordinator under contract | Average annual salary with fringe benefits | $55,420/yr |
| Secretarial/ clerical (1 FTE) | Secretaries/ clerical under contract | Average annual salary at 40 hours per week ($17,544) with fringe benefits | $21,326/yr |
| Volunteer tutors | Volunteers assisting instruction | Estimated market wage rate of $4 per hour. (Volunteers gave 2933 total hours over the year in contributed time) | $11,732/yr |

TABLE 2 (CONT.)

| Ingredient | Description | Components | Costs |
|---|---|---|---|
| Start-up amortization | Start-up coordination, administration, and training of staff | Estimated market price. Based on actual costs for first 6-month coordination, training and facilities of $83,295 annualized at 7% over 5 years | $20,307/yr |
| [Facilities and Furnishings] | | | |
| Total program space | Total space of TLC (3,453 sq.ft.) rented in commercial area | Market rental price | $4/sq.ft./yr<br>$13,812/yr |
| Common area maintenance | Share of maintenance for common areas in commercial area per sq.ft. | Market rental price | $1.40/sq.ft./yr<br>$4,834/yr |
| Facilities maintenance | Routine maintenance for 3,453 sq.ft. provided by school district | Market estimated price (Based on rate of $12/hour * 6hours/week * 52 weeks/3,453 sq.ft.) | $1.08/sq.ft./yr<br>$3,744/yr |
| Facilities utilities and insurance | Utilities and insurance | Market rental price included in contract for space | $2.54/sq.ft./yr<br>$8,761/yr |
| Facilities remodeling | Amortization charges for remodeling of rental space | Market price for remodeling of $44,288 was annualized and included in rental contract | $4.22/sq.ft./yr<br>$14,567/yr |
| Instructional furnishings | Instruct/student desks and chairs: tables and bookcases purchased for TLC | Market price: $11,783 annualized at 7% interest over 10 years | $1,678/yr |
| Office furnishings | Desk and chairs, cabinet, telephone purchased for TLC | Market price: $11,455 annualized at 7% interest over 10 years | $1,631/yr |

TABLE 2 (CONT.)

| Ingredient | Description | Components | Costs |
|---|---|---|---|
| [Equipment and Materials] | | | |
| Instructional technology hardware | Total contents (primarily micro-computer equip-ment) | Market price: $72,492 annualized at 7% interest over 5 years | $17,674/yr |
| Instructional technology software | Total contents (primarily micro-computer software) | Market price: $12,696 annualized at 7% interest over 5 years | $3,095/yr |
| Other instruc-tional materials | Total contents (primarily books) | Market price: $22,802 annualized at 7% interest over 5 years | $5,559/yr |
| [Overhead] | | | |
| School district overhead | Overhead incurred by school district re: accounting, reporting, pro-moting, coordinat-ing. The school contributed these resources along with maintenance to this project | District policy normally charges 10 to 15% of contract ($41,330). However, normal district respon-sibility for maintenance, utilities, facilities and furnishings totaling $34,460 must be deducted in this case | $6,870/yr |

FOOTNOTES FOR TABLE 2:

SOURCES OF DATA

1) Annualized resource cost estimates were computed from resources and expenditures identified in budget, payroll, and expenditure records within the school district and program area for the fiscal period July 1, 1986 through June 30, 1987. Estimates were made for the months of May and June, 1987, based on expenditure patterns of the preceding months. Comparisons of all resource components also were made with expenditure and cost data from the 1985-1986 fiscal period for checks on the consistency of unit cost estimates over time. Confirming consultation also was received from school district and program staff responsible for payrolls and budgets.

PERSONNEL

2) Average salaries for all categories of employed personnel at TLC were estimated from mid-year (March, 1987) payrolls for TLC staff. Contributed time of all volunteer tutors for the year was measured to be 2,933 hours and estimated to cost $11,732 at market value. One full-time equivalent (FTE) for licensed teachers was estimated from a standard of 30 hours per week; and one FTE for volunteer tutors was estimated from a standard of 30 hours per week. All other personnel FTE estimates were from a standard of 40 hours per week.

Fringe benefits were estimated from school district formula and standards for the different personnel classes. Computational descriptions for determining average unit prices for all personnel and other resources are identified in Table 2.

3) Start-up amortization costs were based on actual costs from the first six months prior to operations when staff and facilities were needed for administrative coordination, purchase of equipment and materials, remodeling, and staff training. These costs were annualized at 7% over 5 years.

FACILITIES AND FURNISHINGS

4) All equipment, furnishings and materials purchased or donated during the first two and one-half years of the project were physically inventoried and assigned cost estimates from payment vouchers or estimated market prices. It was estimated that approximately $13,644 in equipment, furnishings and materials were donated by sponsoring agencies, individuals or the school district.

5) All instructional and office furnishings were assumed to have useful lives of approximately 10 years and were accordingly annualized at 7% over 10 years. All instructional technology and software were assumed to have useful lives of approximately 5 years and were annualized at 7% over 5 years. Most instructional computer labs today conventionally assume that the technology will either wear out or become obsolete within a 4 to 6 year period.

6) The total program space of 3,453 sq. ft. was rented from the private sector in a commercial shopping mall for $4 per sq. ft. per year. The commercial facilities also charged $1.40 per sq. ft. for common area maintenance, an additional charge of $2.54 per sq. ft. for utilities and insurance, and an annual charge of $4.22 per sq. ft. for amortization of the $44,288 in remodeling necessary to accommodate TLC in the space. The total rental rate was $12.07 per sq. ft. for a total cost of $41,678 per year in 1986-87.

7) The school district also provided routine maintenance of the instructional and office space. Based on a commercial rate of $12 per hour for a total of 312 hours per year, these costs were estimated to be $1.08 per sq. ft., or $3,744 in extra maintenance costs donated by the school district.

OVERHEAD, INCENTIVE GRANTS AND OTHER

8) The school district through its central office and community education program also incurred additional resource costs for its support of the TLC through its payroll, accounting, reporting, promoting, and coordinating activities. The estimate of $6,870 in annual costs for these donated services was derived from the school district policy of normally charging external grants and contracts between 10% and 15% in overhead charges, and then deducting the services (such as facilities, utilities, furnishings, and maintenance) which were accounted for separately but normally provided by these charges. In this case, 10% of the $413,299 project budget (i.e., $41,330) was reduced by the $34,460 in expenditures for external services normally covered by school districts (i.e., costs of facilities, utilities, furnishings, and maintenance) for a net school district overhead cost of $6,870.

TABLE 3
TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987
PERCENTAGE ALLOCATION OF COSTS TO TLC FUNCTIONS

| RESOURCES | | FUNCTIONS | | |
|---|---|---|---|---|
| Ingredient | Annual Cost | Direct Service | External Training | Research |
| [Personnel] | | | | |
| Licensed teachers | $195,470 | .75 | .05 | .05 |
| Educational assistants | 50,086 | .70 | .10 | .05 |
| Coordinator | 55,420 | .40 | .20 | .15 |
| Secretarial/clerical | 42,652 | .55 | .20 | .05 |
| Volunteers | 11,732 | .95 | 0.00 | 0.00 |
| Start-up amortization | 20,307 | 1.00 | 0.00 | 0.00 |
| [Facilities] | | | | |
| Furnishings amortization | 3,309 | .65 | .05 | .15 |
| Instructional/office space | 13,812 | .65 | .05 | .15 |
| Maintenance | 8,563 | .65 | .05 | .15 |
| Utilities & insurance | 8,761 | .65 | .05 | .15 |
| Remodeling amortization | 14,567 | .65 | .05 | .15 |
| [Equipment and materials] | | | | |
| Instr. hardware amortization | 17,674 | .75 | .10 | .10 |
| Instr. software amortization | 3,095 | .75 | .10 | .10 |
| Other instr. material amort. | 5,559 | .80 | .05 | .05 |
| General/instr. supplies | 2,127 | .67 | .10 | .05 |
| Equipment rental/repair | 165 | .80 | .10 | .05 |
| [Other] | | | | |
| Postage and telephone | 10,005 | .50 | .10 | .10 |
| Printing and publishing | 2,397 | .65 | .15 | .05 |
| Speakers and meetings | 5,766 | .75 | .10 | .05 |
| Misc. supplies and expenses | 506 | .70 | .10 | .05 |
| [Overhead, grants and other] | | | | |
| Overhead of foundation | 16,000 | .20 | .05 | .05 |
| Overhead of school district | 6,870 | .80 | .05 | .05 |
| Incentive grants | 26,406 | 0.00 | 0.00 | 0.00 |
| Evaluation by foundation | 11,089 | 0.00 | 0.00 | 0.00 |
| TOTALS | $532,338 | ---- | ---- | ---- |

FOOTNOTE: Allocations of all resources to TLC functions were estimated by project staff and verified by the formulative evaluator.

TABLE 3 (CONT.)

| Ingredient | Curriculum Development | Incentive Grants | Evaluation | TOTALS |
|---|---|---|---|---|
| [Personnel] | | | | |
| Licensed teachers | .10 | 0.00 | .05 | 1.00 |
| Educational assistants | .05 | 0.00 | .10 | 1.00 |
| Coordinator | .10 | .05 | .10 | 1.00 |
| Secretarial/clerical | .05 | .05 | .10 | 1.00 |
| Volunteers | 0.00 | 0.00 | .05 | 1.00 |
| Start-up amortization | 0.00 | 0.00 | 0.00 | 1.00 |
| [Facilities] | | | | |
| Furnishings amortization | .10 | 0.00 | .05 | 1.00 |
| Instructional/office space | .10 | 0.00 | .05 | 1.00 |
| Maintenance | .10 | 0.00 | .05 | 1.00 |
| Utilities & insurance | .10 | 0.00 | .05 | 1.00 |
| Remodeling amortization | .10 | 0.00 | .05 | 1.00 |
| [Equipment and materials] | | | | |
| Instr. hardware amortization | 0.00 | 0.00 | .05 | 1.00 |
| Instr. software amortization | 0.00 | 0.00 | .05 | 1.00 |
| Other instr. material amort. | .05 | .05 | 0.00 | 1.00 |
| General/instr. supplies | .05 | .03 | .10 | 1.00 |
| Equipment rental/repair | .05 | 0.00 | 0.00 | 1.00 |
| [Other] | | | | |
| Postage and telephone | .10 | .10 | .10 | 1.00 |
| Printing and publishing | .10 | 0.00 | .05 | 1.00 |
| Speakers and meetings | 0.00 | 0.00 | .10 | 1.00 |
| Misc. supplies and expenses | .10 | 0.00 | .05 | 1.00 |
| [Overhead, grants and other] | | | | |
| Overhead of foundation | .05 | .05 | .60 | 1.00 |
| Overhead of school district | .05 | .05 | 0.00 | 1.00 |
| Incentive grants | 0.00 | 1.00 | 0.00 | 1.00 |
| Evaluation by foundation | 0.00 | 0.00 | 1.00 | 1.00 |
| TOTALS | .... | .... | .... | .... |

FOOTNOTE: Allocations of all resources to TLC functions were estimated by project staff and verified by the formulative evaluator.

TABLE 4
TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987
DOLLAR ALLOCATION OF COSTS TO TLC FUNCTIONS

| RESOURCES | | FUNCTIONS | | |
|---|---|---|---|---|
| Ingredient | Annual Cost | Direct Service | External Training | Research |
| [Personnel] | | | | |
| Licensed teachers | $195,470 | 146,602 | 9,774 | 9,774 |
| Educational assistants | 50,086 | 35,060 | 5,009 | 2,504 |
| Coordinator | 55,420 | 22,168 | 11,084 | 8,313 |
| Secretarial/clerical | 42,652 | 23,459 | 8,530 | 2,133 |
| Volunteers | 11,732 | 11,145 | -0- | -0- |
| Start-up amortization | 20,307 | 20,307 | -0- | -0- |
| [Facilities] | | | | |
| Furnishings amortization | 3,309 | 2,151 | 165 | 496 |
| Instructional/office space | 13,812 | 8,978 | 691 | 2,072 |
| Maintenance | 8,563 | 5,566 | 428 | 1,284 |
| Utilities & insurance | 8,761 | 5,695 | 438 | 1,314 |
| Remodeling amortization | 14,567 | 9,469 | 728 | 2,185 |
| [Equipment and materials] | | | | |
| Instr. hardware amortization | 17,674 | 13,256 | 1,767 | 1,767 |
| Instr. software amortization | 3,095 | 2,321 | 310 | 310 |
| Other instr. material amort. | 5,559 | 4,447 | 278 | 278 |
| General/instr. supplies | 2,127 | 1,425 | 213 | 106 |
| Equipment rental/repair | 165 | 132 | 16 | 8 |
| [Other] | | | | |
| Postage and telephone | 10,005 | 5,002 | 1,000 | 1,000 |
| Printing and publishing | 2,397 | 1,558 | 360 | 120 |
| Speakers and meetings | 5,766 | 4,324 | 577 | 288 |
| Misc. supplies and expenses | 506 | 354 | 51 | 25 |
| [Overhead, grants and other] | | | | |
| Overhead of foundation | 16,000 | 3,200 | 800 | 800 |
| Overhead of school district | 6,870 | 5,496 | 344 | 344 |
| Incentive grants | 26,406 | -0- | -0- | -0- |
| Evaluation by foundation | 11,089 | -0- | -0- | -0- |
| TOTALS | $532,338 | $332,115 | $42,562 | $35,122 |
| ESTIMATED PERCENTAGE USE OF TOTAL RESOURCES | 100% | 63% | 8% | 7% |

FOOTNOTE: (1) Allocations of resource costs and expenditures were adapted from resource costs as indentified in Table 1 and resource allocations as identified in Table 3.

TABLE 4 (CONT.)

| RESOURCES | FUNCTIONS | | | |
|---|---|---|---|---|
| Ingredient | Curriculum Development | Incentive Grants | Evaluation | TOTALS |
| [Personnel] | | | | |
| Licensed teachers | $19,547 | -0- | $9,774 | $195,470 |
| Educational assistants | 2,504 | -0- | 5,009 | 50,086 |
| Coordinator | 5,542 | 2,771 | 5,542 | 55,420 |
| Secretarial/clerical | 2,133 | 2,133 | 4,265 | 42,652 |
| Volunteers | -0- | -0- | 587 | 11,732 |
| Start-up amortization | -0- | -0- | -0- | 20,307 |
| [Facilities] | | | | |
| Furnishings amortization | 331 | -0- | 165 | 3,309 |
| Instructional/office space | 1,381 | -0- | 691 | 13,812 |
| Maintenance | 856 | -0- | 428 | 8,563 |
| Utilities & insurance | 876 | -0- | 438 | 8,761 |
| Remodeling amortization | 1,457 | -0- | 728 | 14,567 |
| [Equipment and materials] | | | | |
| Instr. hardware amortization | -0- | -0- | 884 | 17,674 |
| Instr. software amortization | -0- | -0- | 155 | 3,095 |
| Other instr. material amort. | 278 | 278 | -0- | 5,559 |
| General/instr. supplies | 106 | 64 | 213 | 2,127 |
| Equipment rental/repair | 8 | -0- | -0- | 165 |
| [Other] | | | | |
| Postage and telephone | 1,000 | 1,000 | 1,000 | 10,005 |
| Printing and publishing | 240 | -0- | 120 | 2,397 |
| Speakers and meetings | -0- | -0- | 577 | 5,766 |
| Misc. supplies and expenses | 51 | -0- | 25 | 506 |
| [Overhead, grants and other] | | | | |
| Overhead of foundation | 800 | 800 | 9,600 | 16,000 |
| Overhead of school district | 344 | 344 | -0- | 6,870 |
| Incentive grants | -0- | 26,406 | -0- | 26,406 |
| Evaluation by foundation | -0- | -0- | 11,089 | 11,089 |
| TOTALS | $37,454 | $33,795 | $51,289 | $532,338 |
| ESTIMATED PERCENTAGE USE OF TOTAL RESOURCES | 7% | 6% | 9% | 100% |

FOOTNOTE: (1) Allocations of resource costs and expenditures were adapted from resource costs as indentified in Table 1 and resource allocations as identified in Table 3.

TABLE 5
TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987
ALLOCATIONS OF DIRECT SERVICE COSTS TO EDUCATIONAL SERVICE PROGRAMS

| RESOURCES | | EDUCATIONAL SERVICE PROGRAMS | | |
|---|---|---|---|---|
| Ingredient | Direct Services Annual Cost (100%) | Basic Reading (22%) | Grades 5+ Reading (42%) | Math (16%) |
| [Personnel] | | | | |
| Licensed teachers | $146,602 | $32,252 | $61,573 | $23,456 |
| Educational assistants | 35,060 | 7,713 | 14,725 | 5,610 |
| Coordinator | 22,168 | 4,877 | 9,311 | 3,547 |
| Secretarial/clerical | 23,459 | 5,161 | 9,853 | 3,753 |
| Volunteers | 11,145 | 11,145 | -0- | -0- |
| Start-up amortization | 20,307 | 4,468 | 8,529 | 3,249 |
| [Facilities] | | | | |
| Furnishings amortization | 2,151 | 473 | 903 | 344 |
| Instructional/office space | 8,978 | 1,975 | 3,771 | 1,436 |
| Maintenance | 5,566 | 1,225 | 2,338 | 891 |
| Utilities & insurance | 5,695 | 1,253 | 2,392 | 911 |
| Remodeling amortization | 9,469 | 2,083 | 3.977 | 1,515 |
| [Equipment and materials] | | | | |
| Instr. hardware amortization | 13,256 | 1,458 | 6,355 | 2,428 |
| Instr. software amortization | 2,321 | 255 | 1,113 | 425 |
| Other instr. material amort. | 4,447 | 978 | 1,868 | 712 |
| General/instr. supplies | 1,425 | 314 | 598 | 228 |
| Equipment rental/repair | 132 | 29 | 55 | 21 |
| [Other] | | | | |
| Postage and telephone | 5,002 | 1,100 | 2,101 | 800 |
| Printing and publishing | 1,558 | 343 | 654 | 249 |
| Speakers and meetings | 4,324 | 951 | 1,816 | 692 |
| Misc. supplies and expenses | 354 | 78 | 149 | 57 |
| [Overhead, grants and other] | | | | |
| Overhead of foundation | 3,200 | 704 | 1,344 | 512 |
| Overhead of school district | 5,496 | 1,209 | 2,308 | 879 |
| TOTALS | $332,115 | $80,044 | $135,733 | $51,716 |

FOOTNOTE: Excepting adjustments for the usage of volunteer tutors and computers by participants in the Basic Reading program, all other allocations of resources to instructional service programs were estimated and prorated from measured 1987 hourly use of educational service programs. It was estimated by the formative evaluator that participants in the Basic Reading program used the computer only 39% of the time as compared to the use of technology over 90% of the time by participants in all the other instructional programs. On the other hand, almost all of the volunteer tutors were used in the Basic Reading program. Appropriate adjustments in the allocation of these resources were made in the cost computations above. Annual cost data for all direct instructional services were adapted from Table 4.

TABLE 5 (CONT.)

| RESOURCES | EDUCATIONAL SERVICE PROGRAMS | | |
|---|---|---|---|
| | Math and Reading (12%) | Other Programs (5%) | Intake Only (3%) |
| [Personnel] | | | |
| Licensed teachers | $17,592 | $ 7,330 | $4,398 |
| Educational assistants | 4,207 | 1,753 | 1,052 |
| Coordinator | 2,660 | 1,108 | 665 |
| Secretarial/clerical | 2,815 | 1,173 | 704 |
| Volunteers | -0- | -0- | -0- |
| Start-up amortization | 2,437 | 1,015 | 609 |
| [Facilities] | | | |
| Furnishings amortization | 258 | 108 | 65 |
| Instructional/office space | 1,077 | 449 | 269 |
| Maintenance | 668 | 278 | 167 |
| Utilities & insurance | 683 | 285 | 171 |
| Remodeling amortization | 1,136 | 473 | 284 |
| [Equipment and materials] | | | |
| Instr. hardware amortization | 1,810 | 750 | 455 |
| Instr. software amortization | 317 | 131 | 80 |
| Other instr. material amort. | 534 | 222 | 133 |
| General/instr. supplies | 171 | 71 | 43 |
| Equipment rental/repair | 16 | 7 | 4 |
| [Other] | | | |
| Postage and telephone | 600 | 250 | 150 |
| Printing and publishing | 187 | 78 | 47 |
| Speakers and meetings | 519 | 216 | 130 |
| Misc. supplies and expenses | 42 | 18 | 11 |
| [Overhead, grants and other] | | | |
| Overhead of foundation | 384 | 160 | 96 |
| Overhead of school district | 660 | 275 | 165 |
| TOTALS | $38,774 | $16,151 | $9,697 |

FOOTNOTE: Excepting adjustments for the usage of volunteer tutors and computers by participants in the Basic Reading program, all other allocations of resources to instructional service programs were estimated and prorated from measured 1987 hourly use of educational service programs. It was estimated by the formative evaluator that participants in the Basic Reading program used the computer only 39% of the time as compared to the use of technology over 90% of the time by participants in all the other instructional programs. On the other hand, almost all of the volunteer tutors were used in the Basic Reading program. Appropriate adjustments in the allocation of these resources were made in the cost computations above. Annual cost data for all direct instructional services were adapted from Table 4.

TABLE 6

TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987)
TOTAL INSTRUCTIONAL RESOURCE COSTS AND ACTIVITIES
FOR ALL EDUCATIONAL PROGRAMS

| | |
|---|---|
| Average number of students per year | [ 909] |
| Average instructional hours per year | [16,457] |
| Number of modules mastered per year | [ 592] |
| Number of courses mastered per year | [ 177] |
| Average number of hours per student | [ 18] |
| Average number of hours per grade level change for all programs | [ 53] |

| Annual Cost | Ingredient |
|---|---|
| | PERSONNEL |
| $146,602 | Licensed teachers |
| 35,060 | Educational assistants |
| 22,168 | Coordinator |
| 23,459 | Secretarial/clerical |
| 11,145 | Volunteers |
| 20,307 | Start-up amortization |
| | FACILITIES |
| 2,151 | Office and instructional furnishings amortization |
| 8,978 | Instructional and office space |
| 5,566 | Maintenance |
| 5,695 | Utilities and insurance |
| 9,469 | Remodeling amortization |
| | EQUIPMENT AND MATERIALS |
| 13,256 | Instructional technology hardware amortization |
| 2,321 | Instructional technology software amortization |
| 4,447 | Other instructional materials amortization |
| 1,425 | General and instructional supplies/tests |
| 132 | Equipment rental, repair and maintenance |
| | OTHER DIRECT |
| 5,002 | Postage and telephone |
| 1,558 | Printing and publishing |
| 4,324 | Speakers and meetings |
| 354 | Other miscellaneous supplies and expenses |
| | OVERHEAD |
| 3,200 | Overhead assumed by foundation |
| 5,496 | Overhead assumed by publish schools |
| $332,115 | TOTAL TLC INSTRUCTIONAL PROGRAM COSTS PER YEAR |
| 365 | AVERAGE COSTS PER STUDENT PER YEAR |
| 561 | AVERAGE COSTS PER MODULE MASTERED PER YEAR |
| 1,876 | AVERAGE COSTS PER COURSE MASTERED PER YEAR |
| 20 | AVERAGE COSTS PER ACTUAL STUDENT HOUR OF INSTRUCTION |
| 1,070 | AVERAGE COSTS PER GRADE LEVEL CHANGE |

FOOTNOTE: It must be noted that the Average Costs estimated above are only approximations because considerable variance in participation and performance exists between individual students. All participation and performance data were measured and estimated by the formative evaluator for this project.

TABLE 7

TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987)
SUMMARY OF INPUTS, OUTPUTS AND BENCHMARK RATIOS

| Description of Inputs, Outputs and Ratios | Year (1986-87) | |
|---|---|---|
| I. RESOURCE INPUTS FOR DIRECT INSTRUCTIONAL SERVICES | | |
| Total instructional programs cost per year | | |
| Total cost per year for basic reading program | 80,044 | |
| Total cost per year for grades 5+ reading program | 135,733 | |
| Total cost per year for math program | 51,716 | |
| Total cost per year for math and reading program | 38,774 | |
| Total cost per year for other instructional programs | 16,151 | |
| Total cost per year for intake only | 9,696 | |
| Total | ..... | $332,115 |
| Annualized technology costs for all TLC functions | | |
| Instructional technology hardware | 17,674 | |
| Instructional technology software | 3,095 | |
| Instructional furnishings | 1,678 | |
| Facilities remodeling | 14,567 | |
| Total | ..... | $ 37,014 |
| Annualized technology costs for direct instructional services | | |
| Instructional technology hardware | 13,256 | |
| Instructional technology software | 2,321 | |
| Instructional furnishings | 1,091 | |
| Facilities remodeling | 9,469 | |
| Total | ..... | $ 26,137 |
| Total instructional personnel as full-time equivalents (FTE) | | |
| Licensed teachers (FTE) | 6.50 | |
| Instructional assistants (FTE) | 3.04 | |
| Volunteer tutors (FTE) | 2.04 | |
| Coordinator (FTE) | 1.00 | |
| Total personnel (FTE) | ..... | 12.58 |
| Proration of FTE personnel to instructional direct services | | |
| Licensed teachers (FTE) | 4.88 | |
| Instructional assistants (FTE) | 2.13 | |
| Volunteer tutors (FTE) | 1.94 | |
| Coordinator (FTE) | .40 | |
| Total prorated personnel (FTE) | ..... | 9.34 |
| Average salary and benefits per 1 FTE instructional staff | | $ 25,905 |
| Salary and benefits costs for total prorated instructional FTE | | $241,979 |

TABLE 7 (CONT.)

II. PROGRAM OUTPUTS FOR DIRECT INSTRUCTIONAL SERVICES

| | |
|---|---|
| Number of students per year | 909 |
| Number of instructional hours per year for all instruction | 16,457 |
| Number of instructional modules mastered per year | 592 |
| Number of courses mastered per year | 177 |
| Number of students who completed personal goals per year | 72 |

III. INPUT/OUTPUT BENCHMARK RATIOS

| | |
|---|---|
| Students per year per FTE instructional staff | 97 |
| Instructional hours per year per FTE instructional staff | 1,762 |
| Modules mastered per year per FTE instructional staff | 63 |
| Courses mastered per year per FTE instructional staff | 19 |
| Average costs per student per year for all instruction | $ 365 |
| Average costs per instructional hour for all instruction | 20 |
| Average costs per module mastered per year for all instruction | 561 |
| Average costs per course mastered per year for all instruction | 1,876 |
| Average costs per personal goal completed per year | 4,613 |
| Average hours per change in grade level for all programs | 53 |
| Average hours per change in grade level for basic reading | 63 |
| Average hours per change in grade level for grades 5+ reading | 52 |
| Average hours per change in grade level for math | 45 |
| Average costs per grade level change for all programs | $ 1,060 |
| Average costs per grade level change for basic reading | 1,260 |
| Average costs per grade level change for grades 5+ reading | 1,040 |
| Average costs per grade level change for math | 900 |

FOOTNOTE: It must be noted that the output and benchmark ratios estimated above are only approximations and must be viewed with some uncertainty because considerable variance in performance exists between individual students. All student participation and performance data were measured and reported by the formative evaluator. Average hours per change in grade levels were estimated from a follow-up study on participants from a three-month sample period between September and November, 1986.

TABLE 8

TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987)
RECONCILIATION OF CASH BUDGET WITH COSTS OF RESOURCE COMPONENTS

| BUDGET/RESOURCES | PERIOD | | | |
|---|---|---|---|---|
| | JULY 1, 1985 - JUNE 30, 1987 | | | |
| Ingredient | Cash Budget (1) | | Cost of Resources Used (1) | |
| [Personnel] | | | | |
| Licensed teachers | $169,578 | | $195,470 | (2) |
| Educational assistants | 47,382 | | 50,086 | (2) |
| Coordinator | 47,875 | | 55,420 | (2) |
| Secretarial/clerical | 36,000 | | 42,652 | (2) |
| Volunteers | -0- | | 11,732 | (3) |
| Fringe benefits | 34,639 | | -0- | |
| Start-up amortization | -0- | | 20,307 | (4) |
| Subtotal | | $335,474 | | $375,667 |
| [Facilities] | | | | |
| Furnishings amortization | 2,000 | | 3,309 | (5) |
| Instructional/office space | 14,238 | | 13,812 | |
| Maintenance | 4,834 | | 8,563 | (6) |
| Utilities & insurance | 8,761 | | 8,761 | |
| Remodeling amortization | 14,567 | | 14,567 | |
| Subtotal | | $ 44,400 | | $ 49,012 |
| [Equipment and materials] | | | | |
| Instr. hardware amortization | 3,000 | | 17,674 | (7) |
| Instr. software amortization | -0- | | 3,095 | (7) |
| Other instr. material amort. | 7,000 | | 5,559 | (7) |
| General/instr. supplies | 2,700 | | 2,127 | |
| Equipment rental/repair | 200 | | 165 | |
| Subtotal | | $ 12,900 | | $ 28,620 |
| [Other] | | | | |
| Postage and telephone | 8,716 | | 10,005 | |
| Printing and publishing | 2,500 | | 2,397 | |
| Speakers and meetings | 8,309 | | 5,766 | |
| Misc. supplies and expenses | 1,000 | | 506 | |
| Subtotal | | $ 20,525 | | $ 18,674 |
| SCHOOLS BUDGET SUBTOTALS | [$413,299] | | [$471,973] | |
| [Overhead, grants and other] | | | | |
| Overhead of foundation | 16,000 | | 16,000 | |
| Overhead of school district | -0- | | 6,870 | |
| Incentive grants | 26,406 | | 26,406 | |
| Evaluation by foundation | 11,089 | | 11,089 | |
| Subtotal | | $ 53,495 | | $ 60,365 |
| TLC PROJECT TOTALS | | $466,794 | | $532,338 |

TABLE 8 (CONT.)

FOOTNOTES FOR TABLE 8:

(1) Allocations of the cash budget and expenditures/cost of resources were adapted from school and sponsoring foundation records and the tables in this report.

(2) All personnel items include fringe benefits which were overestimated by approximately $6,800 because all fringe benefits were computed by formula for average unit costs for full-time employees as identified in Table 2. On the other hand, a large number of employees (especially instructional staff) during this fiscal period were part-time. Similarly, health and welfare fringe benefits do not begin for new employees until after 6 months of employment and a number of staff began their employment during this period.

(3) Estimated market price for volunteer tutor's time.

(4) Start-up costs were annualized over 5 years at 7 percent.

(5) Total market value for all furnishings were annualized over 10 years at 7 percent.

(6) Includes $3,744 in estimated school district maintenance.

(7) Total market value for all instructional hardware, software, and materials were annualized over 5 years at 7 percent.

TABLE 9

TLC COST STUDY (DATA FROM JULY 1, 1986 - JUNE 30, 1987)
ALLOCATIONS OF COSTS TO TLC CONSTITUENCIES (DISTRIBUTION OF COST BURDEN)

| RESOURCES | CONSTITUENCIES | | | |
|---|---|---|---|---|
| | Annual Cost | Cost to District | Cost to Agencies | Contributed Private Inputs | Cost to Students |
| [Personnel] | | | | | |
| Licensed teachers | $195,470 | $ 93,477 | $101,933 | -0- | -0- |
| Educational assistants | 50,086 | -0- | 50,086 | -0- | -0- |
| Coordinator | 55,420 | -0- | 55,420 | -0- | -0- |
| Secretarial/clerical | 42,652 | -0- | 42,652 | -0- | -0- |
| Volunteers | 11,732 | -0- | -0- | 11,732 | -0- |
| Start-up amortization | 20,307 | 8,529 | 11,778 | -0- | -0- |
| [Facilities] | | | | | |
| Furnishings amortization | 3,309 | 1,191 | 1,986 | 132 | -0- |
| Instructional/office space | 13,812 | -0- | 13,812 | -0- | -0- |
| Maintenance | 8,563 | 3,744 | 4,819 | -0- | -0- |
| Utilities & insurance | 8,761 | -0- | 8,761 | -0- | -0- |
| Remodeling amortization | 14,567 | -0- | 14,567 | -0- | -0- |
| [Equipment and materials] | | | | | |
| Instr. hardware amortization | 17,674 | 353 | 16,968 | 353 | -0- |
| Instr. software amortization | 3,095 | -0- | 3,095 | -0- | -0- |
| Other instr. material amort. | 5,559 | -0- | 5,337 | 222 | -0- |
| General/instr. supplies | 2,127 | -0- | 2,127 | -0- | -0- |
| Equipment rental/repair | 165 | -0- | 165 | -0- | -0- |
| [Other] | | | | | |
| Postage and telephone | 10,005 | -0- | 10,005 | -0- | -0- |
| Printing and publishing | 2,397 | -0- | 2,397 | -0- | -0- |
| Speakers and meetings | 5,766 | -0- | 5,766 | -0- | -0- |
| Misc. supplies and expenses | 506 | -0- | 506 | -0- | -0- |
| [Overhead, grants and other] | | | | | |
| Overhead of foundation | 16,000 | -0- | 16,000 | -0- | -0- |
| Overhead of school district | 6,870 | 6,870 | -0- | -0- | -0- |
| Incentive grants | 26,406 | -0- | 26,406 | -0- | -0- |
| Evaluation by foundation | 11,089 | -0- | 11,089 | -0- | -0- |
| TOTALS | $532,338 | $114,165 | $405,735 | $12,440 | -0- |

FOOTNOTE: Private student costs are not accounted for in this framework (e.g., travel, personal supplies, child care and foregone earnings). Contributions made by the school district and other agencies during the start-up period (January 1, 1985 - June 30, 1985) are accounted for in the annual costs identified above in the amortization items (e.g., start-up amortization, furnishings amortization, instructional technology, software and other materials amortization) and are in Tables 1 and 2.

TABLE 10

TLC COST STUDY (DATA FROM JANUARY 1, 1985 - JUNE 30, 1987)
ESTIMATED START-UP AND RECURRING COSTS FOR ALTERNATIVE INSTRUCTIONAL SETTINGS

| Ingredient | Actual Cash Start-Up Costs for TLC | Cash Start-Up Costs for Community-Based Replication | Cash Start-Up Costs for School-Board Replication |
|---|---|---|---|
| I. Equipment and furnishings | | | |
| Instructional technology hardware | $72,492 | $57,994 | $57,994 |
| Instructional technology software | 12,696 | 10,157 | 10,157 |
| Other instructional materials | 22,802 | 18,242 | 18,242 |
| Instructional furnishings | 11,783 | 9,426 | 9,426 |
| Office and area furnishings | 11,455 | 9,164 | -0- |
| Subtotal | $131,228 | $104,983 | $ 95,819 |
| II. Start-up coordination and training | | | |
| Personnel salaries and benefits | 70,091 | 35,046 | 35,046 |
| Consultation fees | 2,225 | 1,113 | 1,113 |
| Facilities rental | 10,979 | 5,490 | -0- |
| Subtotal | $ 83,295 | $ 41,649 | $ 36,159 |
| III. Facilities remodeling | 44,288 | 44,288 | 44,288 |
| Subtotal | 44,288 | $ 44,288 | $ 44,288 |
| ESTIMATED TOTAL START-UP COSTS: | 258,811 | $190,920 | $176,266 |

| | Actual Recurring Resource Costs for TLC | Estimated Recurring Cash Costs for Community Replication | Estimated Recurring Cash Costs for Public Building Replication |
|---|---|---|---|
| ESTIMATED RECURRING ANNUAL COSTS | $332,115 | $281,706 | $257,467 |

TABLE 10 (CONT.)

FOOTNOTES FOR TABLE 10:

1) All equipment, furnishings and materials were physically inventoried and assigned cost estimates from payment vouchers. All equipment, furnishings and materials purchased or donated during the first two-and-one-half years of the project are included above. It was estimated that approximately $13,644 in equipment, furnishings and materials were donated by sponsoring agencies and individuals. All other data were derived from school district and program area financial records.

2) All instructional equipment, materials and start-up coordination and training were annualized over five-year periods at 7 percent and assigned as annual costs as noted in Tables 1 and 2. Facilities remodeling was annualized by the commercial property management over a three-year period and is reflected in the annual rental payments made by TLC.

TABLE 11

TLC COST STUDY (DATA FROM OR ADJUSTED
TO JULY 1, 1986 - JUNE 30, 1987)
BENCHMARK COST RATIOS FOR ADULT BASIC READING PROGRAM

| Variable Description | Alternative Programs | | | |
|---|---|---|---|---|
| | TLC | Special Education | BES | FIST |
| Type of program | Tutor/ CAI | Classrm | Classrm | Tutor |
| Accuracy of hours | Actual | Actual | Estimate | Estimate |
| Accuracy of costs | Actual | Actual | Estimate | Estimate |
| Costs/student per year | $ 365 | $3,815 | $853 | $670 |
| Costs/hour | $ 20 | $ 15 | $ 6 | $ 7 |
| Hours/grade level change | 63 | N/A | 142 | 59 |
| Costs/grade level change | $1,260 | N/A | $852 | $413 |

FOOTNOTE: Program hours per grade level change were adopted from the summative evaluation report to this project. Cost data for special education, BES, and FIST were adapted respectively from Lewis, et al. (1986), Deveaux (1985), and Darkenwald (1983). The cost and hour estimates for BES and FIST must be viewed with great caution because of their unreliable quality. (Using data from BES reports, it is possible to reconstruct an algorithm to estimate the hours of instruction to change a learner's score one grade level to be 142 hours.) Costs are likely to be underestimated by at least 25% and hours are likely to be overestimated.

# Case Studies: Methodology

The case studies that follow were conducted to provide funders and external audiences with information about two successful TLC students. They portray the human and cognitive elements of the TLC experience, illustrate what it is like to lack basic skills and/or a high school diploma, give examples of the complex lives of the learners who are attracted to the TLC program, assess the impact the TLC program has had, and identify the learners' future aspirations.

The two cases were purposefully selected because they represent two extreme points on the literacy continuum. The first case relates the TLC experience from the standpoint of a learner who had reading skills below the 4th grade. The second case documents one person's experience of studying for and achieving a GED.

The information was collected through face-to-face interviews with the learners, TLC personnel and significant others, and through a review of TLC records. The interviews with the learners were taped; however, the quotes presented have been edited to eliminate redundancy and grammatical patterns that would interfere with the content of the interviews. The case studies were reviewed with the learners to assure that the edited versions accurately represent the learners' statements. Names of the learners and others interviewed have been changed to protect the identity of the participants.

# Case Study 1: Barbara Jenkins

*Katherine R. Wellington, Evaluation Assistant*

## BACKGROUND

Barbara Jenkins is a 65-year-old grandmother who has wanted an education ever since she can remember. She lived her first 12 years in Louisiana with her mother, stepfather and two brothers. She stopped attending school in third grade because her stepfather believed, "You learn to work first; then, you go to school." She and her brothers worked in the fields while her mother cleaned houses for people and her stepfather "didn't do anything." When she was 12, Barbara moved north to St. Paul to live with her aunt and uncle. She started school but soon had to drop out to support her relatives who were unemployed. For the next ten years, while she lived with her aunt, Barbara earned money doing housework, working downtown at Peck & Peck, and working at Armor's Packing House. She continued to hope to attend school, but the time wasn't right.

The next phase of Barbara's life was full of her own family: her marriage, the birth of two daughters, her subsequent divorce, and the raising of two children alone. She is proud of never having been on AFDC; she's held down jobs all her adult life: as a salad-maker at the Criterion Restaurant, as a custodian at a nursing home on Payne Avenue, as a custodian at the Twin Cities Ammunition Plant for 11 years, and for

the last ten years as a custodian at the University of Minnesota. She also does periodic house cleaning for three St. Paul families. Barbara can't imagine retiring saying, "I want to work as long as I feel all right. I want to be active all my life. I couldn't stand to sit at home."

Since her oldest daughter's unexpected death from hepatitis in 1971, Barbara has raised her two granddaughters, now 17 and 19. In addition, Barbara's household consists of her younger daughter and her three children, who are 12, 15, and 17 years old. Barbara is the primary breadwinner. Her younger daughter stays home with the family. Barbara is very proud of her grandchildren as all except the youngest are old enough to earn money and have part-time jobs. The three in Central High School have done well at Central, and the 19-year-old, a Central High School graduate, is planning to attend nursing school in the near future. Barbara encourages her grandchildren to try hard in school, because, she tells them "You don't know what it's like without an education. Also, nowadays, you are going to have to have an education for any kind of job you get, so you are really going to need it."

Barbara's household also consists of several drop-in children who get cared for by Barbara's daughter or the granddaughters. Because Barbara's budget is tight and people don't pay for the family's babysitting, Barbara insists that the extra children not be fed meals when the come. The exception is a one-year-old who is sometimes left off for days at a time because his mother and grandmother don't want him. Barbara doesn't know where the baby would go if her own family didn't care for him.

In addition to her extensive family and job responsibilities, Barbara is an active member of her Baptist church, and particularly involved with

the Usher Board. She is both a local and state Usher Board member, and has also helped with the Junior Usher Board program. Frequently, she assists at funerals, both ushering and then preparing a meal for the bereaved family after the church service. Barbara is proud of the involvement her grandchildren have had with the church. They have served as junior ushers and as members of the cherub and junior choirs.

Not surprisingly, Barbara finds little time to sleep. Her job at the University is from 4 to midnight, Monday through Friday, and she usually gets to bed by 2 or 2:30 a.m., only to be awakened at 5 a.m. when a grandchild gets up to start the day. Occasionally, Barbara goes back to sleep, but usually she saves her longest sleep periods for weekends when she is off work.

## TLC EXPERIENCE

In the last few years, with her grandchildren getting older and needing less constant attention, Barbara has begun to find time to pursue the education she has always wanted. Having heard about TLC on television, she started coming when the program first opened two years ago. Her learning goals are to "be able to read and (do) math and spelling, which is hardest for me to do."

Barbara began her studies with two tutors, and, in 15 months, completed the four Laubach reading books. She speaks positively about the tutors she has had: "They're great; they're really nice people. They work really hard with you, too."

She credits her tutors and the TLC instructors with making the transition smooth from Laubach learning to working on the computers.

"It wasn't hard. I had a lot of help: after the tutors, then the ones on the floor (instructors). Anything I didn't know, they'd come and help me with. Instructors would come around and ask how I was doing. They walk the floor and see if there are people who need help all the time."

Barbara feels she has learned well on computers. "I think they're great!" she says. So far, she has used reading, math, and spelling programs. Giving a Steck-Vaughn spelling lesson as an example, she says she likes the way that "if you make a mistake, it'll tell you what is correct about the work. . . .If you spell it (the word) wrong, at the last of the program it comes back and tells you how many words are wrong in order to spell them correctly." Barbara says the self-correction and immediate-feedback features of the software help her learning.

She reflects on her experience at TLC, commenting, "As you come in the door, you're greeted so you feel welcome; people are nice. Then, if you need any help, all you have to do is ask for help and they (instructors) come. You work as long as you want to work. Then, you tell them you're leaving and they come and sign you out." Flexible leaning time is an aspect of TLC Barbara appreciates because of her many family and job obligations.

She feels she has worked harder at TLC than at another program she recently attended because, she says, "People here help you to read more and to study harder. They help you get different books and ones you're interested in reading and that really makes you WANT to work harder."

One recent TLC experience Barbara speaks positively about is a weekly literature appreciation class she participated in this spring. One

session was held at the Lexington/University branch of the St. Paul Public Library, so Barbara and others could have a tour, get library cards and then borrow books of interest. Barbara found the sections on her own black heritage, on black history and on religion particularly compelling. She borrowed several books that day, and has since returned to get another volume, My Life Without God. She's enthusiastic about the library because, she says, "You find a lot of books you are really interested in reading, and then you want to read more."

TLC's location is accessible for Barbara, who lives close by and drives a car whenever she comes. Barbara is positive about the facility's layout, which, she says, is conducive to learning.

## IMPACT OF TLC ON BARBARA

Barbara remembers well what it was like before she started coming to TLC, when she'd ask herself, "Where do you go for a job? You can't make out an application. You go to a doctor and you can't fill out the forms, and it's very embarrassing. You have to depend on other people to do things like this for you. Sometimes you don't even want to ask your own kids because it's just like you're depending too much on people, and sometimes they do it willingly, and sometimes you have to beg people to help."

Barbara has tried to hide what she calls her "handicap" because of the way it makes her feel when people have known she has had trouble reading and writing. As she explains, "It's really hard to face people and

they know that you can't read and write. It seems like people just look at you (and ask), 'Well, where have YOU been?'"

Barbara has compensated for deficits. For example, she memorized her grocery list and learned what needed items looked like, or she depended on family members when she wanted to read something too difficult for her.

Barbara takes pride in her learning accomplishments thus far. Being able to fill out money orders for the first time is one such achievement. As she says, "Now, since I've been coming here, I've been filling out most of my money orders myself, so I don't need to depend on other people as I used to."

Barbara is also proud of being able to read new words in books, in the Bible, and in newspapers; and of being able to spell words that earlier would have been impossible to write out. Over a 15-month period, Barbara has advanced more than one grade level in both reading comprehension and vocabulary development (actually, more than a grade-and-a-half in the latter area) as measured on the TABE standardized test. She started TLC at a grade level of 2.3 for reading comprehension and 3.1 for vocabulary development.

Barbara observes, "All the progress has made me feel lots better about myself because I can do some of the things I've been wanting to do and I couldn't do. It's made me feel more independent to do things myself instead of depending on other people to do them for me."

Barbara's emerging self-confidence has not gone unnoticed by those who know her. Susan Johnson, a close friend of over 30 years, has seen someone who was formerly reserved, transformed into an outgoing,

involved, confident individual, "not afraid now to approach anything." While Barbara used to shy away from any material she had to read, "she's not that way anymore," according to Susan. Susan, who is a godmother to two of Barbara's grandchildren and is the widow of minister of Barbara's church, is very proud of her good friend's accomplishments. She also feels that if "TLC has helped other people as much as Barbara, It's a great place."

In assessing her literacy improvement, Barbara says, "I can read and write better than I could before. . . LOTS better." Ruth, Barbara's primary Laubach tutor, attributes much of her learner's progress to her excellent attitude. As Ruth remarked, "Barbara was determined to improve, was enthusiastic about learning, dependable, prompt and conscientious. She was also someone who regularly did homework in an effort to improve her skills even more." Even though Barbara has graduated from the Laubach program and is working on her own, her tutor continues to meet with her to help her pursue her interest in reading black history.

## FUTURE FOR BARBARA

Because of her obvious success and satisfaction with learning, Barbara wants to keep coming to TLC. She says, "What's keeping me coming here is I want to learn more. I think if a person sets up something like this for you to go to and learn, you SHOULD go and learn, because it is really hard to live life without any kind of education. I think it's great for people to provide a place like this for you. Yes, I want to come and to continue to come."

Barbara acknowledges that various family obligations have made regular attendance at TLC difficult for her in recent months. However, she is determined, she says, to resume her former three-day-a-week regimen at TLC this summer. With more frequent attendance, she hopes to see greater progress in her learning.

Barbara summarizes her belief in TLC this way: "Many people didn't have a chance to go to school as I didn't, and TLC is helping them to learn. I think it's a really good program; it helps those people that need the help."

## REFLECTIONS OF THE INTERVIEWER

I admire Barbara Jenkins tremendously. Like many other learners I've worked with at TLC, she has coped amazingly well with the handicap of illiteracy. Now, having found a convenient, accommodating learning center she can come to for help, she is determined to improve her reading, math, and spelling skills.

Barbara attended every literature appreciation class I led this spring except for one session missed due to the flu. She changed markedly over the weeks we met; as she became comfortable with the group, her participation increased. She volunteered insightful comments about whatever readings we did, and took advantage of each reading opportunity, including the trip to the public library mentioned earlier.

From talking with those who know her well and from my own conversations with her, I have learned that Barbara is a person respected and relied upon by family and friends alike. For her family, she is the

primary breadwinner, caretaker, and pillar to whom members turn for support and thoughtful guidance.

Barbara once mentioned she feels lucky she has been able to get jobs without having an education. Although she is satisfied with how she earns a living, Barbara continues to want to improve her basic skills for her own sense of self-worth. It is clear from the way she encourages her own grandchildren to study and learn that education is a top priority for her, a value which she hopes to pass on to her younger family members.

# Case Study 2: Sarah Jacobson

*Stacey Hueftle Stockdill, Formative Evaluator*

## BACKGROUND

Sarah Jacobson is a 42-year-old Caucasian woman who was referred to TLC by another program because she worked full-time as a clerical office manager and needed classes which met at night or on weekends. Although Sarah had dropped out of school in the tenth grade, her reading and language skills scored at the top rating of the scale, 12.9. From July to October, Sarah spent 56 hours during 17 days at TLC working on math, social studies, and science and in December, 1986 was awarded her GED. She was then accepted by The College of St. Catherine on the condition that she earn at least a C+ in her first two courses. In her first course, European History, Sarah received a B+. She says her experience in college has been "truly amazing." She feels like a "kid in school" and is "really enjoying learning." Her long-term goal is to obtain a business administration degree, although she cautions that that may change: "It is like a huge door opened. A huge world has opened that I never knew was there!"

The decision to quit high school was one Sarah says she "always felt very poorly about," but in reflection, now realizes was a matter of survival. At that point in her life, she had been placed in a second foster home and felt very strongly that she "had to go out and find work

in order to live." Because of a disturbing family situation and an equally unsuccessful first foster family experience, Sarah developed a low self concept, believing bad things were happening to her because she was a bad person. She thought she must have done something very bad for "God to punish me the way he was." Sarah became very introverted, believing that no one cared for her. Neither her second foster mother, an elderly woman, nor her social worker encouraged Sarah to continue high school. So Sarah went to work.

Although Sarah believes that in her clerical position not having a high school diploma "never really held me back," she also said that her decision to return for her GED was,

> an affirmation, as not having a diploma had really hurt me for a long time . . . .It was always scary wondering if somebody actually found out that I was not a graduate that they would fire me or they wouldn't accept me because I hadn't graduated initially. The hardest thing for me to do was tell my employer. I had worked for him (nine years). . . he's been on the St. Paul School Board. He is very much into education and our company is education-oriented. So the hardest thing I ever had to do was to tell him I was a high school drop-out. I needed to tell because I needed time to go and take the test. He was just so understanding. I couldn't believe it. It was just wonderful. I thought he was going to be disappointed in me,\ and he just thought it was wonderful that I was going back. He came to graduation.

## TLC EXPERIENCE

Sarah initially learned about TLC from Adams School where she had gone to find out how to complete the GED. Sarah tried to study on her own, but found, "I was having some trouble. I needed the structure because I couldn't do it at home alone." Needing evening or weekend

classes because she was working full time, she learned there was one evening class still available but it was at a location she was afraid to attend. Sarah was also having trouble with transportation, so Adams referred her to TLC.

The memories of that first day at TLC are still very vivid for Sarah. "When I walked in, I was very afraid. I felt terrible, like a second-class citizen." She had made an appointment for intake and had taken an early bus to make sure she would be on time:

> I must have been almost a half hour early, because I wasn't sure how long it was going to take me by bus. The people were very friendly and I had only to wait for a few minutes. The receptionist said she would see if the person was available and she came and we got started right away.

The instructors introduced her to the learning center, explained what was available, and talked about the various procedures. Sarah also had to take a proficiency test which was "nerve-racking," but the instructor "assured me it was going to be fine and it was . . . . They understand that people are going to be nervous. They just seem to know and they take that into consideration."

Throughout the interviews, Sarah frequently referred to the instructors and staff of TLC. She remembered that the people at TLC

> treated us like we belonged there, that what we were doing was really important. Another thing I noticed was how patient (the instructors) were. You have a group of people in there at various places of learning and the instructors never, no matter how many times they were asked the same question by the same person, never were ever short. They were always patient, always willing to sit down with you and figure it out. . . I just never remember (high school) teachers being so willing and having such compassion and understanding for a human being."

During the second visit to TLC, Sarah took the Test of Adult Basic Education (TABE). Sarah had taken the same test at Adams earlier, but because of the elapsed time was required to take it again so the results would be valid. Through Sarah's experience we can compare a group test with a one-on-one situation, which is how the test is administered at TLC:

> (At Adams) we had maybe 40 people (taking the TABE test at the same time). There was break in the middle and maybe only half came back. That was so sad. They didn't feel they could finish that. . . . I said to myself, "I hope someday those people go back, whatever it takes inside of them to go back."

Sarah found the staff at Adams "very open, compassionate," but drew a comparison between the group versus the one-on-one testing situation:

> (Margaret) can help you feel more comfortable, probably as comfortable as you are capable of feeling at the time because it's one-on-one and she's there and she's talking to you.

Also, Sarah was surprised that tests were scored right away, expecting to have to return on another day to get results.

Sarah spoke at some length regarding her experiences with the computers:

> I had never worked on a computer before. I have done some word processing, but never worked on a computer. I still remember the response of the computer. It would say, if you had the answer right, "Excellent," or "Super," or "You did a fine job." I wanted to giggle because of some of the responses the computer was giving. Then it would say things to the effect, "No, try again," or something like that when you had answered improperly. You weren't put down. . . and since it wasn't timed, it didn't tell me I was taking too much time or anything.
>
> But then when I went on to higher math, I had a little bit of trouble because of the time. There are

> some procedures that are timed (on the CCC computer system). You wait for a certain period of time and then the red comes up and it tells you you have taken too much time. I became very frustrated with that. One day I had to leave because I was so depressed. I told (the instructor) my problem and... he gave a book and I just left (the CCC computers). I just stayed with the lesson in the book, and I passed my math.

Sarah's experience with this system suggest that TLC instructors may need to monitor the interaction between the CCC computer and the learner very closely. For some courses the timing function can be adjusted, which, in this case may have helped Sarah. It is critical that instructors monitor this because, as Sarah related, "There was certainly a time in my life when I would not have been able to admit that I was not capable of working (on the CCC). I might have tried to struggle through it." Sarah compared this experience with high school experiences which reduced her self-esteem, the "not getting it and not getting it each time and then when I took a test, I would fail the test." Sarah credits the instructors with finding a method that worked for her so she could learn the concepts.

Sarah did not have much contact with other students at TLC but she said,

> I was just amazed at the scope of the problem. I think women were bringing in children to help them with their math and people in their 50s were learning. It just gives me goose bumps when I think about it because of the variety of people, and they come from all walks of life and were all there for the same purpose.

The TLC center was designed to provide students with the greatest flexibility in scheduling. For Sarah, this schedule was particularly beneficial:

> I would get there as early as I possibly could on Saturday and I would usually stay until closing. It was good for me to have the availability of the hours on Saturday because at that time I was working anywhere from 50 to 60 hours a week, so during the day after work I would be very tired.

She found TLC to be a program where one could work at one's own speed, a factor she credited as being "really important."

When Sarah first tested at TLC, the test administrator recommended that she take the reading and writing GED test without delay. Her TABE scores were 12.9 in those areas.

> I was so scared when I went to take (the GED test). I was just wringing my hands and everything else. When I passed it, they told me right away. I was just floating when I walked out of there. I called (TLC) right away and told them I had passed. . .. (At Adams) they told me to test right away, too. I just didn't have enough self-confidence without doing any study at all. I felt that (taking the GED) was kind of final. I didn't realize that you could go back and take it over. . . pretty high pressure on myself. . .. The woman who was giving the GED test at Adams said, "You're going to be high, highest in the state." I 'm going, "I can't think about his; I just can't think about it." I wasn't even through testing. And then (TLC) told me my scores were so high that I could be highest in the state. And I really was, was highest at that time.

GED graduation was a wonderful experience for Sarah. She had invited her employer and a few very close friends. "I was such a nervous person that day, I was so excited." Of her employer, she said, "It was like having a mom and dad who were most thrilled that their child graduated." She also said that one of her friends, who had a degree from the University, "found it much more touching and exciting than a high school commencement and was very moved by it all."

In reflecting upon the influence of the GED upon her self-esteem, Sarah said:

> You can walk with your head up and feel good. You don't have to think of yourself as anything but o.k. I wouldn't be afraid to admit to anyone that I have a GED. It would never bother me at all. Before I started, I guess I thought it was going to be second-best, but now I don't think that at all.

Because of the contribution TLC was making to Sarah's life, she felt that she wanted to pay for her classes at TLC.

> I kept asking, "What's it going to cost?" and there was no cost. I guess I wanted to pay, to pay something, because it's so valuable and I can pay. . . I realized that a lot of people can't afford very much and I probably couldn't afford a lot either, but I just thought I should be paying. I certainly wouldn't want to say anything that would put anything in jeopardy for someone else.

In asking Sarah to speculate upon students who would not complete the TLC program, Sarah said that if her experience was anything like others, timing would be a critical factor. She talked about how this was the right time for her. For others, there might be things to take care of "that were much more pressing so one couldn't devote time to study" or that someone is "not committed to it for one reason or another." For others it may be difficult to continue because "they are starting at a very elementary level." She emphasized that,

> No one can have a feeling of not being wanted there. . . I couldn't see what any of the instructors at TLC can do any different than what they're doing to encourage those people to continue. I think that the fact that the instructors were so positive about things--were so affirming--that, if nothing else, that would keep learners coming back.

In response to the interviewer's final question, Sarah said:

> It was a good experience for me, one I'll never forget. I would never have considered an interview like this a few years ago. I've changed an awful lot.

> . . . I could just rave about TLC. I was afraid I'd come here and I would sound like I was preaching. If I do sound that way, it would be because that's the way I feel inside.

## REFLECTIONS OF STAFF AND THE INTERVIEWER

Interviews with TLC and Sarah's employer confirm the dramatic changes Sarah has related. One instructor said, "Sarah would come into TLC and sit very quietly. She was a diligent worker but always seemed sad, insecure, and down all the time." The test administrator remembered Sarah as being "nervous," "unsure," and "needing affirmation" that she could be successful when taking the GED test:

> She wanted to do well but lacked the self-confidence. She did well on the test but was surprised. She seemed pleased but didn't believe that she could do it.
>
> When she started passing her GED tests with really high scores, she was really surprised, but pleased, and started to grow in self-confidence.

The test administrator went on to say, "It is clear that Sarah had to overcome more than dropping out of school. She has had to surmount a lot of problems."

Sarah's employer also mentioned that attaining the GED has been a "big boost to her self-confidence, a real ego builder." He talked about the GED graduation and how it is clear that each graduate had to "sacrifice" to attain that goal. He also said, "For the funders, I can't imagine they will find a better return for the buck. Because of the program, Sarah has made a major change in career goals." A previous St. Paul School Board member familiar with computer assisted instruction programs, he commented, "TLC appears to have found the right

combination to help these people study." He went on to recommend, "The funders should talk to the people who have participated in the TLC program as it is from the participants that they will truly know the impact the program has had."

It is clear that Sarah has grown dramatically in self-esteem as a result of obtaining a GED. As an evaluator, I chose not to relate all the grisly details of her childhood. I hope, however, that failure to do so will not hide the harsh reality of Sarah's early existence. It is only in recent years, and as her confidence grows, that Sarah has emerged from her protective shell to begin to trust. I truly admire her and recognize that it is only through her determination that her future has opened up. It is most fortunate that TLC was available for her.

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